THE NATURE OF STRONG BELIEF

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Declaration

The work presented in this thesis is the result of my own work. The material contained in this thesis has not been presented, nor is currently being presented, either wholly or in part, for any other degree or qualification.

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Contents

List of tables

List of figures

List of abbreviations

APA	American Psychological Association
DSM	The Diagnostic and Statistical Manual of Mental Disorders
MS	Mortality Salience
TMT	Terror Management Theory
CT	Conspiracy Theories
CMQ	Conspiracy Mentality Questionnaire
GCBS	The Generic Conspiracist Belief Scale
CFI	Comparative Fit Index
TLI	Tucker Lewis Index
CFA	Confirmatory Factor Analysis
CRT	Cognitive Reflection Test
SRMR	The Standardized Root-Mean-Square Residual
RMSEA	Root-Mean-Square Error of Approximation
PADS-R	The Revised Paranoia and Deservedness Scale
BIC	The Bayesian Information Criterion
MLR	Robust maximum likelihood estimation
ω	omega reliability
ωH	Omega hierarchical reliability
H	Construct replicability.
ωR	Relative omega reliability
I-ECV	Item explained common variance
S	Strong belief general factor
MES	Master Explanatory System
ANCOVA	Analysis of covariance

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Abstract

Background

Many kinds of beliefs can be held both strongly and emotionally, which means that they can prove difficult to change. Such beliefs can be either pathological (e.g. delusions) or non-pathological (e.g. religious, political and supernatural beliefs as well as belief in conspiracy theories). The difficulty associated with distinguishing between delusions and other types of strong beliefs has given rise to the term 'master explanatory systems' (MES), which include paranoid beliefs, belief in conspiracies, political beliefs, religious beliefs and paranormal beliefs. The present study sought to investigate the commonalities between pathological and non-pathological beliefs, in addition to their correlation with other psychological constructs.

Methods

This study comprised three large-scale online surveys and one online experiment. The first survey involved over 500 participants from three different universities (Liverpool, Ulster and Oxford) in the United Kingdom (UK). The second survey involved a representative sample of 1508 participants from the UK, while the third survey involved a smaller representative sample (about 630 participants) of the UK population. Finally, the online experiment involved 245 participants, who were divided into two groups.

The data derived from the three surveys and the online experiment were analysed by means of different statistical approaches. First, a confirmatory factor analysis was performed to study the relationship between paranoia and belief in conspiracy theories, while a multivariate regression was run between the two types of beliefs and certain other psychological constructs. Second, the same statistical approach as used in the first study was also used to investigate the relationship between religious (monotheistic) belief and atheism. Third, a bifactor analysis was performed to determine whether there was a common latent

factor (or 'S') underlying all the MES. Finally, a mortality salience intervention was conducted to examine the effect of the fear of death on the strong belief latent factor S.

Results

The first study revealed that paranoia and belief in conspiracy theories are better explained as two separate yet related factors. Moreover, they are both related positively to loneliness and factors relevant to the external locus of control (i.e., powerful others and chance). However, belief in conspiracy theories but not paranoia was related positively with poor analytical reasoning.

The second study indicated that religious belief and atheism are also can better explained as two distinct yet related factors. The scale that was designed for the two factors (monotheism and atheism) was found to exhibit high reliability.

In terms of the third study, a bifactor model incorporating strong beliefs of paranoia, beliefs in conspiracies, religiosity, and nationalism as well as the three factors associated with paranormal beliefs was found to have a better fit indices when compared with the confirmatory factor analysis of those beliefs, while the latent strong belief factor S was found to underlie all the MES.

Finally, the online experiment revealed that the mortality salience manipulation increased the participants' death anxiety, worsened their analytical reasoning, and enhanced the S.

Conclusions

Taken together, the findings of this study support the existence of the strong belief latent factor S. The surveys showed S to exhibit consistent correlation with the other psychological constructs of interest. However, further studies involving clinical samples are recommended to replicate and extend the present findings.

Chapter 1. Paranoia and Delusions

1.1 Introduction

This chapter presents an in-depth discussion of the psychological literature concerning paranoia and delusions. It begins by defining the concept of delusion and then offers a comprehensive overview of the various types of delusions. Next, it discusses the prevalence and relationships of these different delusions with regard to psychiatric diagnoses. The difficulty associated with distinguishing delusions from other types of beliefs, such as religiosity, conspiracy theories, political ideologies and paranormal beliefs, is also discussed. The chapter concludes by offering a summary of the discussion and setting out the implications for a phenomenological approach to identifying delusions.

1.2 Definition of Delusions

In common parlance, the term 'delusion' is considered to refer to 'a false belief or opinion about self or situation'. In its most widely accepted use, the term signals the harbouring of erroneous beliefs or sentiments regarding a certain subject, despite the existence of factual evidence to the contrary (Oxford English Dictionary, 2020). This interpretation, therefore, assumes that delusions represent a variety of strong belief, which requires a clear conceptualisation of belief. Borrowing from the realm of philosophy, the field of psychology holds that beliefs are propositions about the world that are considered to be true (Schwitzgebel, 2015). Further, these propositions should (i) be coherent both individually and broadly as part of other webs of beliefs, (ii) be supported by evidence that is subjectively sufficient and (iii) have an impact on an individual's (believer's) actions and emotions when subjected to relevant circumstances (Pechey, 2010).

In terms of psychiatric theory, delusions are often considered to be beliefs that can be analysed as propositional attitudes under the constraints of coherence and rationality (Mullen & Gillett, 2014). However, this approach to delusions is not universally accepted. For example, Berrios (1991) argued that delusions are not meaningful speech acts and, further, that their content does not refer to either the world or the self.

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychological Association [APA], 2013) adopts the aforementioned approach, defining delusions as

> fixed beliefs that are not amenable to change in light of conflicting evidence. Their content may include a variety of themes. The distinction between a delusion and a strongly held idea is sometimes difficult to make and depends in part on the degree of conviction with which the belief is held despite clear or reasonable contradictory evidence regarding its veracity (p. 87).

It is common for paranoia and delusions to be confused in the literature, although they are fundamentally different but overlapping constructs (i.e., there are non-paranoid delusions, non-delusional paranoia, and paranoid 'persecutory' delusions). The core feature of paranoia is ideation regarding personal vulnerability and exaggerated socially evaluative concern that others are threatening the well-being and safety of the self (Meisel et al., 2018). Moreover, as will be discussed in the following section, paranoia as a type of delusion, namely persecutory delusion.

1.3 Types of Delusions

It has previously been argued that delusions can be divided into two broad types: pedestrian and stark. Pedestrian delusions entail cognitive mistakes in terms of the belief(s) held, while stark delusions are simply inexplicable because they are not associated with a belief system that can be deduced and analysed logically (Klee, 2004). However, the former type of delusion would not be considered a true delusion in most psychiatric accounts.

Another general categorisation of delusions, which was proposed by Karl Jaspers (1997), yields two other contrasting types of delusions, primary delusional beliefs, and overvalued ideas. Primary delusions represent a broad category of delusional beliefs that are 'irreducible' and so can only be understood by analysing an individual's personality and past experiences. Jaspers (1997) discussed primary delusions as false judgements that exhibit four qualifying characteristics: (i) the delusion or delusion-like belief is held with extraordinary conviction, (ii) that conviction is impervious to counterarguments and past experiences, (iii) the belief entails impossible content and (iv) the belief is not understandable. Jasper's (1997) understandability criterion is crucial, and it is signalled by the inability of the clinician to understand how the patient's belief had arisen based on their personality and experiences. For Jaspers (1997), therefore, delusions are a consequence of a sudden 'breakdown in meaning'.

This distinction assumes that delusions are qualitatively different from other kinds of beliefs and attitudes. Such a notion is supported by phenomenological research that has sought to identify subtle differences in mental states between people who suffer from delusions and people who strongly hold beliefs of other kinds. For example, the German researcher Klaus Conrad developed a 'stage model' for the formation of delusions during the onset of schizophrenia (Bovet & Parnas, 1993). He carefully interviewed 107 schizophrenic

soldiers and determined that their delusions were preceded by an altered way of experiencing both themselves and the world. Conrad referred to this initial stage as 'Trema' (i.e. stage fright) because it concerns the feeling that something is about to happen. Conrad's findings were limited by the homogeneous nature of the all-male sample as well as by the failure to compare their experiences with the experiences of people who exhibit strongly held yet non-psychotic beliefs (Mishara, 2009).

In contrast to phenomenological researchers, many modern psychologists assume that delusions exist on a continuum alongside more usual beliefs and attitudes (Freeman et al., 2005). The reasoning for this will be briefly set out below, although this chapter will first consider how delusions can be classified according to their content, as described by Kraepelin (1990) in his account of the symptoms of dementia praecox (schizophrenia).

1.3.1 Persecutory Delusions

The first type of delusion, which is perhaps the most common type, comprises persecutory delusions. This type of delusion is mainly characterised by the strong belief that another party is intent on causing harm to the self (Bentall et al., 2001). Some scholars view persecutory delusions as a form of paranoia in which individuals exhibit a strong conviction that others seek to harm them (Freeman, 2016).

Freeman (2016) expounded on persecutory delusions by asserting that they are threat beliefs that have been developed in the contexts of environmental and genetic risks and, further, maintained by various psychological predispositions and processes. Among the psychological predispositions considered by Freeman (2016) are low self-confidence, intolerance of the effects of anxiety and anomalous experiences, biases in reasoning (e.g. a tendency to jump to conclusions regarding sequentially experienced information and a

tendency to attribute experiences to external causes) as well as worries and safety-seeking strategies. In an earlier paper co-authored with other scholars, the excessive use of experiential reasoning and the limited use of rational reasoning were associated with persecutory ideation (Freeman et al., 2012). However, while Bentall et al., (2001) implicated the same psychological processes, they argued that persecutory delusions function as a form of defence against low self-esteem by attributing the causes of negative experiences to the malign intent of other parties. It has proved quite difficult to devise psychological tests capable of distinguishing between Freeman's (2016) direct threat belief model and Bentall et al.'s (2001) defensive model. Indeed, a recent meta-analytic summary of the relevant psychological literature found mixed evidence and so did not decisively support either approach (Murphy et al., 2019).

A common feature of the two models is the fact that delusional paranoia is considered to exist on a continuum with subclinical paranoia. As such, the hierarchy of paranoia entails five stages of paranoia in non-clinical populations, ranging from simple social evaluative concerns to severe threats (Freeman et al., 2005). At the most basic stage, paranoid thoughts begin as social evaluative concerns, for example, the fear of vulnerability or rejection and the belief that the world is potentially dangerous. The second stage entails ideas of reference, wherein social evaluative concerns are asserted and processed cognitively, for example, by harbouring beliefs that others are watching or talking about the self. The third stage entails the aggregation of these paranoid thoughts to a mild threat level, at which point the individual starts to think that others want to irritate them or cause them distress. The fourth stage involves a moderate threat level, and the individual develops the belief that other people are going out of their way to adversely affect the individual's well-being. During the final stage, which entails a severe threat level, the individual is described as being fully paranoid. They

harbour the belief that others are determined to cause them harm physically, psychologically and even socially. Moreover, they believe that others are conspiring against them. This hierarchy of paranoia is illustrated in Figure 1.1.

Figure 1.1

The Hierarchical Structure of Paranoia (Freeman et al., 2005)

Recent studies have sought to statistically test whether paranoid beliefs do indeed exist on a continuum. One approach in this regard has involved looking for evidence in large epidemiological datasets. Bebbington et al. (2013) used data from the UK Adult Psychiatric Morbidity Survey to investigate the distribution of paranoid ideation among the general population. Their study identified persecutory ideas as having four components, namely interpersonal sensitivity, mistrust, ideas of reference and the fear of being deliberately

harmed. They found strong evidence of a continuum. Yet, their study was limited by the fact that it included no clinical participants. More recently, Elahi et al. (2017) used three taxometric methods to assess the continuum of paranoia among 360 psychotic patients, 157 prodromal (incipient psychosis) patients and 2357 healthy individuals. They found a dimensional latent structure of paranoia to be a better fit than a categorical structure, which suggests the similarity between the processes involved in subclinical paranoia and those involved in clinical paranoia.

1.3.2 Grandiose Delusions

Grandiose delusions entail unfounded and often exaggerated beliefs that the individual has special attributes, for example, wealth, identity and power, which should be revered (Isham et al., 2019). Individuals with grandiose delusions often think extremely highly of themselves and place themselves on a pedestal, typically believing that they are superior to others. Generally, such individuals not only treat themselves as special but also expect or demand that others treat them in a special manner too.

Due to the exorbitantly high status that individuals with grandiose delusions award themselves, this type of delusion is sometimes referred to as the 'delusion of exceptionality'. However, a recent qualitative study found that patients who hold such beliefs are often more preoccupied with their lives having a special meaning than with being superior to other people (Isham et al., 2019). Although grandiose delusions are quite common, there remains a dearth of research on them, perhaps owing to their perceived benign nature when compared with other forms of delusions. However, this perception might be misleading because grandiose delusions can be harmful in some cases (e.g., believing one has supernatural powers and walking into traffic) (Isham et al., 2019).

1.3.3 Delusions of Control

Human beings perceive themselves to be free moral agents who are at liberty to choose their own course of action. With this sense of free will comes a sense of control over the self that is frequently challenged by environmental (local) factors (Roskies & Nahmias, 2017). It has been argued that delusions of control stem from this sense of free will (Riemer, 2018). Delusions of control encompass the strong belief that others are trying to exert control over the individual and, therefore, that the individual's will is being impeded. Several variants of these kinds of beliefs were included among Schneider's (1959) first rank symptoms of schizophrenia, including feelings, impulses and volitional acts that a patient has experienced and believed to be controlled by an external force.

A distinction is made in the literature between the sense of agency and the sense of ownership. For instance, a person who is being pushed from behind has a sense of ownership of the experience (i.e. they are the one having the experience) but not a sense of agency (Gallagher & Trigg, 2016). From this perspective, delusions of control are considered to be experiences of a diminished sense of agency, whereas other disorders (e.g. anxiety disorders such as agoraphobia) more clearly reflect diminished self-ownership (a threat to the integrity of the self that is created by overwhelming and uncontrollable emotion).

1.3.4 Delusions of Reference

Delusions of reference entail incorrigible beliefs that something refers to the self even when it does not and there exists evidence to the contrary (Startup et al., 2009). Such delusions concern the individual's impervious belief that he/she is the subject of an issue or that he/she is pertinent to that issue even when it does not concern him/her. As such, depending on the

source of the belief, there are two kinds of delusions of reference: delusions of reference concerning communication and delusions of reference concerning observation (Startup et al., 2009). As the names suggest, delusions of reference concerning communication entail strong beliefs that others are conveying information in subtle or non-verbal ways that the individual cannot understand, while delusions of reference concerning observation entail strong beliefs that others are referring to the induvial by virtue of observing their conduct.

As common psychotic symptoms, it is important to distinguish between delusions of reference and ideas of reference. Although both stem from the actions or communications of others, individuals with ideas of reference change their ideas when presented with evidence to the contrary, whereas individuals with delusions of reference do not change their mind even when presented with evidence to the contrary.

1.3.5 Delusions of Guilt

Delusions of guilt, which are sometimes referred to as delusions of sin or self-accusation, refer to the individual's strong belief that he/she has committed some atrocious offence and so is deserving of punishment (Bentall et al., 2001). Such individuals hold the strong belief that the sins they have committed are unpardonable, meaning that they are burdened with guilt and await the inexorable consequences of their actions.

Delusions of guilt are sometimes confused with persecutory delusions, and it can prove difficult to distinguish between the two. It has been argued that persecutory delusions can be subdivided into two main types depending on whether or not they are accompanied by guilt: 'bad me' delusions and 'poor me' delusions (Chadwick et al., 2005). The first type involves beliefs whereby an individual feels that they utterly deserve to face persecution due to their failings in life or bad actions, while the latter entails beliefs that the individual does

not deserve the persecutions they undergo as they have not previously committed sins. As such, 'bad me' persecutory delusions are in some way delusions of sin because the individual believes that they have committed acts deserving punishment and, further, because they are also willing to accept punishment in retribution. Empirical studies have indicated that paranoia in non-clinical groups tends to be predominantly of the 'bad me' type, whereas patients with psychosis tend to either constantly hold 'poor-me' paranoid beliefs or fluctuate between the two kinds (Melo et al., 2006; Morrison et al., 2015; Udachina et al., 2012).

1.3.6 Other Delusional Disorders

Thus far, this chapter has discussed the five most common subtypes of delusions according to their content, as proposed by early studies on the subject, beginning with the work of Kraepelin (1990). However, there exist several other distinct types of delusions. Among them is the somatic type of delusion, which entails strong beliefs that the individual's bodily appearance is grossly unnatural or deformed when compared with other human beings, or that the individual's organs or bodily parts are malfunctioning (Bates et al., 2019). This false belief causes individuals to believe that they have a medical problem or some sort of physical defect, although in reality they are normal. A good example of somatic delusions is the oral somatic delusion, which entails the individual believing that their mouth is deformed.

Erotomanic delusions entail the belief that the individual is loved by or in love with another individual – often of a higher status – whereas in reality there exists no such relationship (Bates et al., 2019). Occasionally, men exhibit the delusion of pregnancy, meaning that they believe they have been impregnated and are heavily pregnant with a child (Chengappa et al., 1989). Both men and women who are intimate partners can also exhibit

the jealous subtype of delusional disorder, which involves the strong belief that their partner is being unfaithful to them (Bates et al., 2019).

Finally, delusions of misidentification have received considerable research attention, especially from neuropsychologists who are interested in the processes involved in identifying others on the basis of their facial features. The most well-documented of these delusions is the Capgras delusion (Capgras & Reboul-Lachaux, 1923; Ellis et al., 1994), which involves the belief that others, usually those who are usually emotionally close to the patient, are being replaced by imposters or robots.

1.4 Prevalence and Relationship with Diagnosis

Having discussed some of the most common types of delusions in the previous section, it should now prove useful to consider the prevalence of delusions and their relationships with psychiatric diagnoses. This issue is inherently problematic because, as has previously been discussed, defining delusions has proven to be challenging. Furthermore, over the past 20 years, a vigorous debate has arisen regarding the value of conventional categorical psychiatric classifications (Bentall, 2004, 2009). A variety of alternative approaches have been suggested in this regard, including dimensional models (e.g. van Os & Kapur, 2009), empirically driven hierarchical taxonomies (Kotov et al., 2017), network models that assume symptoms cluster not due to underlying disease processes but because they causally influence each other (Borsboom & Cramer, 2013) and approaches such as the US National Institute of Mental Health's Research Domain Criteria programme, which searches for transdiagnostic processes common to a range of psychiatric disorders (Insel et al., 2010).

One approach to examining the prevalence of delusions involves the use of epidemiological data. Since the 1980s, a substantial number of epidemiological studies have

attempted to assess the distribution of psychiatric symptoms among representative samples of mainly Anglo-Saxon (North American, British, European, Australian and New Zealand) populations. A large-scale study conducted by van Os et al. (2000) found that, in a sample of more than 7000 Dutch people, about 3% had 'true' delusions and about 9% had 'not clinically relevant' delusions. A 15-year longitudinal study conducted by Poulton et al. (2000) in Dunedin, New Zealand, found that, by the time the participants were in their early 20s, around 13% were paranoid. Moreover, in a study conducted in France by Verdoux et al. (1998), over 1000 patients who were visiting their family doctors were asked to complete a questionnaire about common delusional beliefs. Only about 11.5% of patients were visiting the doctor due to psychiatric problems. Beliefs about 'people not being who they seemed to be' were found to be the most common (reported by about 69% of patients, although it could be argued that this is not delusional and simply refers to the perception that others are dishonest), while delusions that 'the individual had experienced telepathic communication' were reported by about 47% of patients and delusions about 'seemingly innocuous events having double meanings', 'the individual being persecuted in some way' and 'occult forces being at work' were reported by 42.2%, 25.5% and 23.4%, respectively.

With regard to conventional diagnoses, delusions are typically considered to be symptoms of disorders within the psychotic domain. For example, Schneider (1959) identified three types of delusions of control as being among the first rank symptoms of schizophrenia. Recent studies have reported that delusions in general occur in the majority of patients diagnosed with schizophrenia. For instance, in a large-scale study conducted among 811 acute schizophrenic patients, the World Health Organization (WHO; 1973) reported that persecutory, reference and mood delusions were present in 52%, 50% and 49% of patients, respectively. Paranoid beliefs have been found to be present in around 70–90+% of patients

presenting with a first episode of schizophrenia (Freeman & Garety, 2014; Moutoussis et al., 2007). Delusions have also been frequently reported as symptoms in patients diagnosed with both bipolar disorder (Baethge et al., 2005; Black & Nasrallah, 1989; Burton et al., 2018) and major depression (Coryell et al., 1984; Johnson et al., 1991).

Within the DSM, the term 'delusional disorder' is used to indicate the presence of underlying delusional beliefs without other symptoms of psychosis (Upthegrove & A. S., 2018). However, while psychotic disorders are experienced by up to 7% of the population during their lifetime (Perela et al., 2007), this diagnosis is very rare (a lifetime risk of 0.05–0.5%) and has a later age of onset when compared with other psychoses such as schizophrenia (Joseph & Siddiqui, 2019).

A number of prior studies have considered the prevalence of specific delusions. For example, the persecutory and jealous types of delusions have been found to be more common in males, whereas erotomanic delusions have been found to be more common in females (Joseph & Siddiqui, 2019).

A study concerning the prevalence of delusional jealousy, which is a widely known risk factor for both homicide and violence, found it to be a comparatively rare phenomenon that is only abundant in schizophrenia and related psychoses (Soyka & Schmidt, 2011). From a large sample of data from 14,309 patients who were being treated at a psychiatric hospital over a period of about eight years, the study identified only 72 cases of delusional jealousy (representing only 0.5% of the sample), with 59.7% of the cases being males. This prevalence was, however, higher among the schizophrenia patients at 1.3%. Standing out amongst the symptoms that were relied upon when determining the relationship with diagnosis in the study were violence and aggression, which were exhibited by approximately a fifth (20.8%) of the patients.

Another study found that delusions of reference were a common phenomenon during early psychosis (Wong et al., 2008). From a sample of 137 outpatients who were exhibiting early symptoms of psychosis, 31.4% (*n* = 47) of patients were diagnosed with ideas or delusions of reference. A generally equal representation was identified in terms of both sexes and various sociodemographic factors. Although the study determined that it was impossible to explain delusion based solely on patient characteristics, it found a strong association between this particular delusion and persecutory delusions.

As discussed above, persecutory delusions are the most prevalent type of delusion in patients with psychosis. Indeed, over 70% of patients experiencing a first episode of psychosis are diagnosed with persecutory delusions (Freeman & Garety, 2014; Moutossis & Bentall, 2007). Freeman and Garety (2014) highlighted six factors of particular important in relation to influencing these kinds of beliefs: negative beliefs about the self, reasoning biases (e.g. a tendency to jump to conclusions), worry thinking styles, sleep disturbances, interpersonal sensitivities and anomalous internal experiences.

1.5 Distinguishing Delusions from Other Types of Beliefs

As previously noted, it is often difficult to distinguish delusions from other types of strongly held beliefs. As such, questions arise as to whether certain strong beliefs represent delusional disorders or simply symptoms of paranoid schizophrenia (Marneros et al., 2012). The diagnostic and epidemiological research reviewed in this chapter has typically assumed that the distinction is clear or, at least, possible to make in principle. To date, only a very few researchers have systematically compared delusions to belief systems such as political beliefs, religious beliefs or other beliefs that are often held tenaciously and with great conviction (Bentall, 2018).

Chapter 2. Master Explanatory Systems

2.1 Introduction

This chapter builds on the last chapter, which discussed the difficulty associated with distinguishing between delusional and non-delusional beliefs. In light of this difficulty, it is pertinent to consider whether delusions – and here the focus will be on paranoid beliefs because they are the type of delusion that has been most frequently studied – are similar to other strongly held beliefs. This chapter begins with a brief discussion underscoring the need to consider the framework of strong beliefs leading to delusions and paranoia. It then delves deeper and discusses religiosity, political ideologies, conspiracy theories and paranormal beliefs as part of the master explanatory systems (MES) of strong beliefs.

2.2 Framework of Strong Beliefs Leading to Delusions and Paranoia

The difficulty of distinguishing between delusional and other kinds of strongly held beliefs is exemplified by two – now classical – case studies in which it proved vital to assess certain strong beliefs to ascertain the diagnoses of the individuals who held them as well as the implications of their actions.

The first case study involved a murder trial in which the mental health professionals who testified as expert witnesses were asked to determine whether the alleged murderers were suffering from a shared psychotic illness or simply held an extreme religious belief (Utah v Lafferty, 1984). Ron and Dan Lafferty had visited the home of their brother Alan, who was married to Brenda. At the time, Brenda was taking care of her 15-month-old daughter, Erica. They killed both Brenda and Erica by stabbing them and then fled, attempting to evade the law. They were, however, later arrested and charged. They alleged that they had been

instructed by Jesus Christ to commit the murders. Indeed, being strong Mormon fundamentalists, they believed that Dan was the present-day Prophet Elijah, who spoke the word of the Lord. A conundrum arose during the trial because the mental health professionals could not agree as to whether the brothers suffered from a shared psychotic illness or simply held extreme religious beliefs.

A similar scenario occurred in another trial, this time for mass murder (Norwegian State v Anders Behring Breivik, 2012). Anders Breivik killed a total of 77 people and injured 319 others on 22nd July 2011. He detonated a bomb in Oslo, which killed eight, and then proceeded to the nearby Utøya Island, where he shot to death 69 young political activists attending a summer camp, injuring 319 others. Breivik claimed that he was a member of a secret organisation of Knights Templar that radically fought feminism, Islamification, immigration and other axioms that they felt were leading to cultural suicide in Europe. An initial pretrial psychiatric analysis report compiled in December 2011 had found that he was suffering from paranoid schizophrenia, which would have allowed his lawyers to successfully submit a plea of insanity. The report was thus massively criticised, and two new psychiatrists were appointed by the court. These psychiatrists declared Breivik to be legally sane. In the ruling, the court stated that he was sane and fit for sentencing, although it was noted that he held strong conspiracy theory beliefs, as do many other people.

These two case studies illustrate the difficulty of distinguishing between delusions and two types of belief systems that are commonly held with great conviction and, further, that are often resistant to counterarguments. Bentall (2018) proposed that beliefs of these kinds can be considered to be MSE: ‘master’ because they dominate reasoning about the world and social relationships, ‘explanatory’ because they are used to account for everyday experience

and ‘systems’ because they consist not of particular propositions but rather of structured networks of propositions.

2.3 Religiosity as an Aspect of the MES of Strong Beliefs

Religion is a complex human phenomenon comprised of various elements that are not always closely associated with each other. For instance, most religious systems consist not only of sets of propositions about the world (e.g. “There is a God”) but also of certain rituals and practices as well as communities of individuals who share the same beliefs. It is possible, for example, for someone to be a regular worshipper for entirely social reasons and without strongly believing religious doctrine or for someone to strongly believe the doctrine without engaging in communal worship.

In this chapter, the focus is on the propositional aspects of religion, that is, beliefs and doctrine. Globally, these are enormously variable. Even when studies have focused on the monotheistic/Abrahamic religions, they have suggested different factor analytics depending on their approach to the analysis. For example, Lemos et al. (2010) identified four religious factors and determined that two of them (belief in God and supernatural beliefs) can be defined as beliefs. However, Koenig and Büssing (2010) used only a single religiosity factor in the five-item Duke University Religion Index. which supports the approach to consider religiosity as a strong belief.

Religion often illustrates two stark contrasts: the conservative and the extremist approaches. Although conservatism is viewed as somewhat liberal in terms of accepting and respecting others’ views, while extremism is viewed as radical due to attempts to impose religious views on others, there is no clear-cut difference between the two positions (Mohdin, 2016). The key issues are the implicit level of belief that believers attach to their religions and

the extent to which they are willing to act out the postulates of their beliefs. Explanations of such beliefs have been used in the media in an attempt to associate terrorist attacks with one of two explanations, namely insanity or religious fundamentalism. For example, in the second case study discussed in the previous subsection concerning the need to consider strong beliefs, Anders Breivik was declared to be mentally ill due to suffering from paranoid schizophrenia, whereas the perpetrators of the 9/11 attacks were branded as religious zealots (Obaidi, 2016).

An important question when considering religiosity as an MES concerns its relationship with other kinds of beliefs. First, a question arises as to whether religious people are the same as those who believe in the paranormal. This issue was examined in a study regarding whether there was a significant relationship between the level of religiosity and the individual differences between two groups: (i) religious and paranormal believers and (ii) sceptics (Aarnio & Lindeman, 2007). Internet-based questionnaires were administered to a large sample of 3261 Finnish participants, and the responses indicated a positive relationship between religious and paranormal beliefs among both paranormal believers and sceptics, but a negative relationship among religious people. Thus, the empirical relationships between the two types of belief systems may be very complex.

It has previously been suggested that religious belief may help individuals to cope with the threat of their own mortality. For example, in a study exploring the existential function of religion among Christians, Muslims, atheists and agnostics, significant differences were found when examining the participants' management of death awareness (Vail et al., 2012). In three quasi-experimental studies, reminders of death were found to enhance belief in a higher power (God/Jesus, Allah and Buddha) among practicing religious groups, although they had no effect among atheists.

There has been considerable speculation as to the age differences of religious belief. A study of religiosity across various age groups conducted in 106 countries revealed that young adults were less religious and so less susceptible to strong beliefs emanating from religion (Pew Research Center, 2018). Interestingly, older people were found to be more religious in most countries (Pew Research Center, 2018). This finding suggests that cultural factors that impact different cohorts early in their lives may have a strong impact on whether or not they become religious.

Other studies have sought to understand the psychological mechanisms that predispose people to be religious. For example, one such study assessed the impact of the level of understanding of the physical world on religious and paranormal beliefs (Lindeman & Svedholm-Hakkinen, 2016). The study revealed that supernatural beliefs associated with religion correlated with poor mental rotation, poor intuitive and physical skills, poor mechanical abilities, low systemising and analytical thinking styles, as well as other physical and biological phenomena. High correlation was also found between supernatural beliefs and the assigning of mentality to non-mental phenomena. A further regression analysis of this subject confirmed that strong beliefs were influenced by overall physical capabilities entailing skills, interest and knowledge as well as intuitive thinking styles.

Another important consideration when discussing religiosity as an aspect of MES is the impact of religion on psychotic symptoms. For instance, religious content has been found to arouse hallucinations in patients diagnosed with paranoid schizophrenia (Krzystanek et al., 2012). In a retrospective analysis of medical notes collected between 1932 and 1992, religiosity was found to contribute to the hallucinations of 46.8% of patients. Interestingly, religious hallucinations were found to have increased significantly during the period following the apocalyptic events of the Second World War.

Another study considered religious delusions in patients with psychosis and assessed how they interacted with the patients' spiritual coping (Mohr et al., 2010). The study involved 236 outpatient psychotic patients, including 38 with already identified delusions of religious content, 85 with other types of delusions and 113 with no persistent delusional symptoms. The study found that for almost half the study population (45%), the spirituality associated with religion helped them to cope with their illnesses. However, those patients with religiosity-based delusions were found to have more severe clinical psychoses than the other patients, were more likely to abscond from psychiatric treatment services and received less treatment support from religious communities.

2.4 Political Ideologies as an Aspect of the MES of Strong Beliefs

It has been suggested that religiosity exerts an impact on politics by promoting authoritarianism and dispelling democratic values (Hunsberger, 1995; Schwartz & Huismans, 1995). Such claims are often based on the assertion that strong religious beliefs ensure strict adherence to religious constructs and, therefore, place believers under the control of their religious leaders. As the previous section discussed religiosity as an aspect of MES, it is appropriate to begin this section by considering the impact of religiosity on politics.

Using Israel as a case study of a religious nation, a prior study evaluated the effect of religiosity on the endorsement of democratic values (Canetti-Nisim, 2004). The study found that, despite their strong perceived religiosity as well as the unsettled political and security atmosphere of the country, Israelis believe in democratic values to a considerable extent, which counters the idea that religiosity affects political ideologies and decreases support for democracy in favour of autocracy.

An earlier study by the same author that was conducted in Germany found contrasting results when examining the impact of religiosity on political ideologies (Canetti-Nisim, 2003). It was determined that religiosity culminates in political extremism, which undermines democracy. Considering religion from the two vantage points of mainstream religion and alternative religions, Canetti-Nisim (2003) found that they converged in terms of the attitudes and perceptions toward democracy in Germany. According to the author's understanding of the German context, religion has two meanings: one characteristic of mainstream religion with belief in the supernatural and the other characteristic of alternative religiosity without belief in the supernatural. Although the belief systems of these two religious leanings were found to be different, Canetti-Nisim (2003) argued that they were similar in that they both undermined or challenged the prospects of democracy in favour of their own beliefs.

Some prior studies of political ideologies have suggested that such ideologies can be universally described based on the right (conservative)-left (liberal) dimension (Jost et al., 2009). The former school of thought has a preference for conserving political institutions as they are, while the latter supports radical change and the introduction of new systems (Jost et al., 2009). Political leftist schools support the tenets of freedom, equality and rights among others, advocating for more liberal government stances, while rightist schools support absolute authority, hierarchy and order in governance, thereby advocating for hegemony and authoritarianism with more autocratic regimes. However, other studies have indicated that political ideologies can best be described by a two-dimensional structure of right-wing authoritarianism and a social dominance orientation. The term 'right-wing authoritarianism' (RWA) was first used by Altemeyer (1981) to describe people who willingly submit to authorities and uphold their social norms while being hostile in terms of their attitudes toward those who hold different political beliefs. In arriving at this definition, Altemeyer

(1981) refined the work on authoritarianism by Adorno et al. (1950; Bizumic & Duckitt, 2018). Pratto et al. (1994) used the term 'social dominance orientation' (SDO) in their work on social dominance theory. An SDO indicates that an individual differentiates between in-group relations, desires those relations to be equal or hierarchical and perceives the social roles they need to take on.

Prior studies have indicated that political ideologies influence the physiological and psychological responses of individuals to their environments (Hibbing et al., 2014). Indeed, it has been claimed that conservative individuals tend to devote more psychological resources and reasoning to political constructs. Conservative individuals are, therefore, more likely to hold strong political beliefs than liberal individuals.

Other research on political leftist and rightist ideologies has indicated that political extremism is a major factor in relation to predicting conspiracy theories (van Prooijen et al., 2015). Citing four studies conducted in the United States and the Netherlands, van Prooijen et al. (2015) showed a strong relationship between political ideologies and conspiracy beliefs. People in both the extreme left-wing and extreme right-wing groups exhibited a preference for simple solutions to societal problems as well as for conspiracy theories, while the effect was smaller on those participants who were politically moderate. The study concluded that political extremism is related to strong beliefs regarding conspiracies due to the highly structured thinking styles used by extremists to understand and assess political actions. Moreover, recent studies reported that political ideologies and extreme religious beliefs are associated with poor performance on cognitive tests that tap cognitive flexibility (Zmigrod et al., 2019; Zmigrod et al., 2019).

A meta-analysis of the psychological predictors of conservativism found that it was associated with high levels of death anxiety, intolerance of ambiguity and the need for closure

as well as with low levels of tolerance of uncertainty, integrative complexity and self-esteem (although the latter effect was small) (Jost et al., 2003). However, a more recent study found that political conservatives are happier than liberals and so are less susceptible to certain extreme beliefs (Schlenker et al., 2012). Based on four case studies, Schlenker et al. (2012) revealed that conservative individuals are likely to have greater personal agency characterised by responsibility and self-control, a stronger outlook of positivity due to their self-worth and optimism, more transcendent moral beliefs stemming from religiosity, tolerance of others and a greater belief in fairness. These constructs were found to account for their happiness. The findings of Schlenker et al. (2012) appear to contradict media stereotypes of conservatives as unhappy and dissatisfied individuals.

Moreover, a recent study conducted in Sweden discredited the idea that conservatives are more susceptible to extreme beliefs. The study indicated that it is not just conservatives who are predisposed to extremist beliefs, as extreme right- and left-wing individuals are more inclined to strongly believe and adopt conspiracy theories when compared with moderate individuals (Krouwel et al., 2017). Such people are often less interpersonally trustful and engage in more negative economic and political evaluations of their environments. On this basis, extreme political ideologies – whether rightist or leftist – can be seen to predispose individuals to a range of inflexible strong beliefs.

2.5 Conspiracy Theories as an Aspect of the MES of Strong Beliefs

As discussed above, some political ideologies culminate in conspiracy theories. These conspiracy beliefs have been found to stem from a plethora of political, social and psychological factors (Douglas et al., 2019).

Conspiracy theories entail plots shrouded in secrecy that are set in motion by two or more powerful actors. Such plots often revolve around attempts to usurp economic or political power, infringe agreements, withhold information or vital secrets, violate people's rights and alter institutions for ulterior motives (Douglas et al., 2019). Individuals perpetrate such conspiracy beliefs by using them to explain prejudices, revolutions, terror and even genocide. Due to rejecting the scientific consensus, the advocates of conspiracy theories have also been responsible for individuals rejecting mainstream medicine to the point that certain curable diseases remain prevalent in some parts of the world. Even global warming has been misconstrued as a result of conspiracy beliefs. It is, therefore, important to consider conspiracy beliefs as an aspect of the MES of strong beliefs.

As highlighted above, extreme political ideologies, whether leftist or rightist, are known to contribute to the formulation of conspiracy theories. For instance, an Italian survey study found conspiracism to be negatively associated with education and positively associated with religiosity, although no significant correlation was found with political trust (Mancosu et al., 2017).

Conspiracy theories have been associated with various cognitive predispositions, including susceptibility to other conjunction fallacies. The conjunction fallacy is a form of probabilistic reasoning error in which people overestimate the probability of two events happening simultaneously (Brotherton & French, 2014). Brotherton and French (2014) employed a correlation analysis of two independent studies. In the first study, the participants who endorsed conspiracy theories were found to make more conjunction errors than those who did not endorse conspiracism. In the second study, the findings of the first study were evaluated by means of replication using an independent sample to reduce the systemic risks.

It was determined that conspiracism is directly associated with domain-general susceptibility to conjunction fallacies and errors in belief.

Conspiracism is also associated with a reduced capacity for analytic thinking (Swami et al., 2014). Based on four studies with a large sample size of 990, Swami et al. (2014) found a strong belief in conspiracy theories to be associated with lower analytic thinking and reduced open-mindedness. More positively, they found that even among such individuals, verbal fluency tasks could be effectively used to elicit analytic thinking.

Conspiracist thinking is not always maladaptive. Consider a unique albeit common type of conspiracy theory: commercial conspiracy. This entails the belief that parties engaged in commerce are conspiring to defraud others for some commercial gain, for example, to increase their profit. A pilot study with a British sample of over 300 participants revealed that most individuals were cynical with regard to advertising gimmicks employed by organisations such as banks and drug, alcohol and tobacco companies (Furham, 2013). Such people believed that the companies were not revealing the true position of their businesses to the markets in which they operate, as they were instead focusing on making a killing from the markets. Further analysis revealed that less religious, more pessimistic, more economically challenged and less open-to-experience individuals were more likely to trust and propagate commercial conspiracism beliefs.

The underpinnings of the renowned conspiracy novel *The Da Vinci Code* (Brown, 2002) represent one of the most well-known contemporary cases of conspiracy theories about Christian history. According to the book, the Roman Catholic Church kept secret Jesus' marriage to Mary Magdalene, from which a "holy lineage" originated, which was guarded by the Priory of Sion (Newheiser et al., 2011). An analysis of the functional nature of the beliefs described in the book and the impact they have on readers provided a useful summary of

conspiracy theories (Newheiser et al., 2011). In the analysis, the underlying psychological factors, individual differences and other factors that could contribute to belief in conspiracies were assessed, and they were counterchecked against resistance to counterevidence (Newheiser et al., 2011). The analysis revealed that people were more likely to believe in the constructs of *The Da Vinci Code* if they had previously held congruent religious beliefs (New Age spiritual) rather than competing (Christian religion) beliefs.

2.6 Paranormal Beliefs as an Aspect of the MES of Strong Beliefs

A number of factor-analytic studies have suggested that belief in paranormal ideologies creates a coherent set of dispositions and predispositions (Lange & Thalbourne, 2002). A single factor of paranormal belief was suggested in studies using the Australian Sheep-Goat Scale, wherein the 'sheep' represent the paranormal believers and the 'goats' represent the unbelievers, the scale has 18 items (e.g., 'I believe I am psychic' and I believe I have marked psychokinetic ability') and the responses are ranging between '*true*', '*uncertain*', and '*false*' (Drinkwater et al., 2018; Lange & Thalbourne, 2002). The Australian Sheep-Got scale is consisted of 18 Although the multidimensional structure of paranormal beliefs was suggested in analyses of the Paranormal Belief Scale (PBS; Tobacyk & Milford, 1983), a single dimension appears to dominate this structure (Tobacyk, 2004).

It has been argued that paranormal beliefs and delusional beliefs are related in the sense that they have similar foundations in terms of individuals' thought processes being impacted by cognitive dysfunctions (Irwin et al., 2012). Using a convenience sample of 207 participants, Irwin et al. (2012) administered online questionnaires to measure paranormal beliefs, confirmation bias, inferential confusion and metacognitive beliefs. The study revealed that paranormal beliefs can be predicted by assessing the abstract cognitive factors

associated with inferential confusion, which is a reasoning style determined by imperfect judgments about the possible states of relationships in real life, and confirmation bias, which refers to the extent to which people tend to favour and recall information that supports their own beliefs.

The impact of meta-cognition on paranormal beliefs was assessed in another study that yielded similar results. Drinkwater (2017) examined the impact of paranormal beliefs on individual resilience, as assessed using a mental toughness scale, and adaptive coping mechanisms. Among the conclusions of this study was the notion that mentally tough individuals are better able to cope with adaptive behaviour even in stressful situations and so are less susceptible to paranormal beliefs. Conversely, individuals who are not mentally tough are more susceptible to paranormal beliefs, which represent just one pathway to many psychoses.

Another psychological factor that might contribute to paranormal beliefs is cognitive complexity. General cognitive abilities are known to be negatively correlated with paranormal beliefs (Tam & Shiah, 2004). As such, there is high correlation between education levels, which indicate cognitive complexity and development, and paranormal beliefs.

2.7 MES of Strong Beliefs

This chapter has discussed the nature of MES. Such belief systems, similar to delusions, are held with great conviction and so are resistant to counterarguments, although they are not usually considered to be delusions, probably due to their prevalence (Bentall, 2018). The subsequent empirical chapters of this thesis describe a series of studies of MES, mainly based on surveys, which explore the structures of such belief systems, the relationships between them and the psychological mechanisms that might explain their co-occurrence.

Chapter 3: The paranoid and conspiracy mentalities are related but distinct phenomena: Structure and psychological correlates.

3.1 Abstract

Paranoia and conspiracy theories both involve suspiciousness about the intentions of others but have rarely been studied together. In three studies (*N* = 496, *N* = 1,519 and *N* = 638) we compared single and two-factor models of paranoia and conspiracy theories as well as associations between both belief systems and other psychological constructs. Two-factor model were best fit in all of the three studies. Both belief systems were associated with poor locus of control (powerful others and chance) and loneliness. Paranoid beliefs were associated with negative self-esteem and, in two studies, insecure attachment; conspiracy theories were associated with positive self-esteem in all three studies and narcissistic personality traits in the final study. Conspiracist thinking but not paranoia was associated positively with poor performance on the Cognitive Reflection Task. The findings suggest that paranoia and belief in conspiracy theories are distinct but correlated belief systems with both common and specific psychological components.

3.2 Introduction

In a seminal essay written during the McCarthy period, the American historian Richard Hofstadter (1952) described the persistence of a 'paranoid style' in American politics. Hofstadter gave numerous examples of this style from the history of his own country (for example, panics about the activities of the Illuminati in the 18th century and about the Freemasons in the 19th) but noted that it is not monopolised by any particular nation nor any particular political ideology. This paranoid style is, arguably, still discernible in modern political discourse but communism no longer figures prominently amongst the threats to our way of life, which Appelrouth (2017) now suggests "come in a variety of forms, some old, some new: 'Islamofascists', homosexuals, liberals, illegal aliens, feminists, the mainstream media" (p. 344).

Although Hofstadter (1952) said that he had, "neither the competence nor the desire to classify any figures of the past or present as certifiable lunatics" (p. 3-4) he argued, nonetheless, that it was reasonable to borrow the term 'paranoid' from the clinical literature. The style, he argued, had to do with "the way in which ideas are believed and advocated rather than with the truth or falsity of their content" (p. 5) so that "the feeling of persecution is central, and it is…. systematised in grandiose feelings of conspiracy" (p. 4). His essay and subsequent commentaries have therefore assumed at least a close parallel or even equivalence between the forms of paranoia observed in psychiatric patients and the conspiracy theories that characterise extremist political thinking, implying that belief in conspiracies might be a subclinical variant of the kind of paranoia observed in the psychiatric clinic.

The only difference that Hofstadter (1952) acknowledged was that "the clinical paranoid sees the hostile and conspiratorial world in which he feels himself to be living as

directed specifically against him; whereas the spokesman of the paranoid style finds it directed against a nation, a culture, or a way of life" (p. 4). As Imhoff and Lamberty (2018) have recently noted, this difference – that paranoia concerns threats to the individual whereas conspiracies are explanations that attribute important events to secret plots by powerful groups – implies that the former may be linked to interpersonal vulnerability and the latter linked to distrust in political institutions. However, because theoretical accounts of paranoia (e.g. Bentall et al., 2001; Freeman, 2016) and conspiracy theories (e.g. Brotherton, 2015) have developed separately with very little cross-referral between the two literatures, there have been few attempts to study the relationship between the two phenomena.

3.2.1 Paranoid beliefs

Paranoid delusions, characterised by the belief that others may be intending harm to the individual, are a common symptom of severe mental illness associated with significant distress in patients with psychosis (schizophrenia). However, sub-clinical paranoia is widely experienced (Freeman et al., 2005) with studies indicating that up to 20 per cent of healthy individuals show significant paranoid ideation (Verdoux et al., 1998). Psychometric evidence confirming that clinical paranoia lies at the extreme end of a continuum with non-clinical paranoid beliefs (Bebbington et al., 2013; Elahi et al., 2017) might be thought to provide support for Hofstadter's thesis.

There is compelling evidence that paranoia, both in population and clinical samples, is associated with early life adversity – especially disrupted attachment bonds – and also adverse socioeconomic circumstances (for a review, see Bentall et al., 2015). Well

established models of the psychological mechanisms responsible, although differing in detail, emphasize the role of negative self-schematic processes (Bentall et al., 2001; Freeman, 2016). Consistent with this approach, an external locus of control (Kaney & Bentall, 1989; Mirowsky & Ross, 1983), negative beliefs about the self (Tiernan et al., 2014) and insecure attachment styles (Pickering et la., 2008; Wickham et al., 2015) have all been associated with paranoia in both clinical and non-clinical populations. However, cognitive impairments have also been implicated in both paranoid patients (Bentall et al., 2009) and also in deluded patients in general. For example, a highly replicated finding is that paranoid and other deluded patients show a tendency to 'jump-to-conclusions' when making judgments about sequentially presented data (Dudley et al., 2016).

3.2.2 Conspiracy mentality

Like paranoia, conspiracist thinking is common in the general population. In a recent analysis of the US National Comorbidity Study-replication (*N* = 5645), 26.7% agreed with the item, "I am convinced there is a conspiracy behind many things in the world"; endorsement of this item was associated with lower educational achievement and earnings, being outside the labour force, belonging to a minority ethnic group, poor well-being and low social capital (Freeman & Bentall, 2017). Because conspiracy theories are often shared, they may have important political consequences. For example, their endorsement is associated with the rejection of socially important scientific theories, such as the theory that global warming is the consequence of human use of fossil fuels (Lewandowsky et al., 2013).

Although many specific conspiracy theories are in wide circulation (e.g. the Apollo Moon landings were faked; the British secret service murdered Princess Diana) there is

evidence of a general disposition to believe in conspiracy theories, sometimes referred to as conspiracy mentality (Bruder et al., 2013). Hence, people who believe in one conspiracy theory are likely to believe in other even contradictory conspiracy theories, for example that it is plausible that Princess Diana faked her own death and also that she was killed by the British government (Wood et al., 2012). Nevertheless, Conspiracy theories can be influenced by situational factors, particularly the experience that life is uncontrollable, which appears to lead to greater willingness to believe them (van Prooijen & Acker, 2015; van Prooijen, 2017); consistent with this observation, it has been shown that individuals who have a high need for closure seize on conspiratorial explanations for uncertain events when such explanations are readily available (Marchlewska et al., 2018). Other individual difference factors are also likely to be important, and some of these appear to mirror those thought to be important in paranoia. For example, Swami et al., (2014) and van Prooijen (2017) found that conspiracy theories were associated with poor analytic thinking, whereas Freeman and Bentall (2017) and Green and Douglas (2018) found that, like paranoia, they are associated with insecure attachment. Other studies (Cichocka et al., 2016; de Zavala & Fredrico, 2018) have found that conspiracy theories are associated with individual and collective narcissism and, consistent with this last observation, Imhoff and Lamperty (2017) found that people high in conspiracy mentality have a need to feel unique, and are more likely to endorse conspiracy theories if they think that they were endorsed only by a minority.

3.2.3 Empirical studies of the association between paranoia and conspiracy theories.

Only a modest number of studies have empirically investigated the relationship between paranoia and conspiracy theories. Grzesiak-Feldman and Ejsmont (2008), in a small sample of Polish students (*N* = 50) found that endorsement of conspiracy theories about

Jews, Arabs, Germans, and Russians positively correlated with scores on Fenigstein and Vanable's (1992) paranoia scale. Darwin et al., (2011), in a study with 120 students, found that conspiracy mentality, paranoia and schizotypy (but not paranormal beliefs) were inter-correlated. Bruder et al., (2013), in a validation study for their Conspiracy Mentality Questionnaire (see below) found that it correlated strongly with Fenigstein and Vanable's (1992) paranoia scale (r = .40, N = 120) and Brotherton and Eser (2015) reported a strong correlation between paranoia and scores on their Generic Conspiracist Beliefs Scale (r = .52, N = 150). Wilson and Rose (2014) reported modest associations between paranoia and belief in conspiracy theories in a number of student samples (r varying between .27 and .30). Cichocka et al., (2016), using data from three online studies (Ns varying from 202 to 505) found that CTs were associated with narcissistic personality traits; although a positive correlation was found between conspiracy theories and paranoia, this effect was explained by paranoia mediating between low self-esteem and conspiracy theories. Finally, in the analysis of the NCS-R data, also found a positive association between paranoid beliefs and scores on the one-item conspiracy beliefs measure, but associations between insecure attachment and conspiracy theories survived even when paranoia was controlled for (Freeman & Bentall, 2017).

In a meta-analysis of 11 datasets from seven of these studies (plus one study not considered here because a nonspecific measure of schizotypy rather than paranoia was employed), Imhoff and Lamberty (2018) found considerable heterogeneity in the data, but the overall effect size was equivalent to a correlation of r = .36 between paranoia and belief in conspiracy theories. In a complex analysis of data from an online survey of 209 German participants using three different measures of paranoia and three measures of belief in conspiracy theories, inter-correlations within the constructs (e.g. different measures of

paranoia) were stronger than those between them and a two correlated factor model was found to best fit the data. The latent paranoia variable was found to correlate more with personal variables (e.g. high neuroticism, the tendency to feel egocentric threat) whereas the conspiracy belief factor correlated with politically relevant measures (e.g. low trust in government). These findings were broadly replicated in larger sample (*N* = 390) of US citizens.

3.2.4 Purpose of the present study

Here we report three studies in which we build on Imhoff and Lamberty's (2018) findings by testing the relationship between paranoia and conspiracy theories, first in a large student sample and then in two large samples representative of the UK population. The studies had two broad aims. First, we aimed to determine whether paranoia and belief in conspiracy theories are separate phenomena. In all three studies we therefore used confirmatory factor analysis to compare models in which paranoia and conspiracy theories are treated as a single construct and those in which they are treated as separate but correlated constructs, predicting that the latter would be a better fit. To test the robustness of the findings, we used two different measures of paranoia and two different measures of belief in conspiracy theories across the three studies, and in our final study we also took steps to eliminate possible method effects attributable to differences in item design.

Second, if paranoia and conspiracy theories are independent but correlated phenomena, it seems likely that some of the psychological processes which explain these propensities are shared whereas others are unique to each. We therefore tested associations between both paranoia and conspiracy theories with psychological constructs

that have previously been shown to be important in either one or both of them. Based on the literature available to date (Tiernan et al., 2014), and Imhoff and Lamberty's (2018) argument that paranoia is uniquely associated with interpersonal vulnerability, we expected that paranoia would be more closely associated with negative beliefs about the self than conspiracy theories. Past research suggests that both belief systems will both be associated with an external locus of control (e.g. Kaney & Bentall, 1989; van Proojen & Acker, 2015) and insecure attachment (e.g. Pickering et al., 2008; Green & Douglas, 2018). Given that conspiracy theories have been associated with narcissism (Cichocka et al., 2016; de Zavala and Fredrico, 2018), and given the previously reported strong association between paranoia and negative beliefs about the self (Tiernan et al., 2014), we expected narcissism to be specifically associated with conspiracy theories (Study 3).

In two studies (2 and 3) we considered the relationships between both belief systems and analytical reasoning. Although dual process theories of cognition differ in detail (Evans, 2008) it is now widely accepted that human reasoning processes fall into two main types: type 1 (fast, intuitive and associative) versus type 2 (slow, analytic, rational and propositional) (Kahneman, 2012), and it seems plausible that thinking about emotionally-laden topics such as conspiracies and paranoia will be cognitively 'miserly', that is to say dominated by type-1 thinking and with limited engagement of more effortful type-2 thinking. Freeman, Evans, and Lister (2012) reported that high paranoia scores in healthy individuals were associated with self-reported experiential (intuitive, from the gut) reasoning. Swami et al., (2014) reported similar findings for belief in conspiracy theories and that priming analytical thinking reduced belief in conspiracies. However, the associations were modest and Freeman et al. (2014) were unable to replicate their finding for paranoia in a clinical sample. A limitation of these studies is that they used a self-report measure of

the two types of reasoning whereas an objective measure would be preferable. In our second and third studies we therefore included expanded versions of Frederick's (2005) Cognitive Reflection Test (CRT), which measures 'miserly' cognition in which type 1 thinking is not regulated by more effortful type-2 analytical thinking (Toplak et al., 2014). Bronstein et al. (2019) reported a modest association between poor performance on the CRT and subclinical paranoia, and a similar association has been reported for conspiracy theories by van Prooijen (2017). Hence, we expected that poor CRT performance would be associated with both belief systems in this study.

Finally, in Studies 1 and 2 we examined the relationships between paranoia and belief in conspiracy theories and social relationships, although our predictions were more tentative. On the one hand, because (as Hofstadter pointed out) paranoid beliefs tend to be idiosyncratic whereas conspiracy theories tend to be shared, it might be predicted that paranoid people would be more socially isolated, and hence lonelier, than people who believe in conspiracy theories and, indeed, in a previous study with a student sample we found that paranoia was strongly associated with loneliness (McIntyre et al., 2018). On the other hand, in previous studies, loneliness has been associated with poor interpersonal trust (Rotenberg, 1994) and, in our own previous work, we found that conspiracy theories were associated with low social capital (Freeman & Bentall, 2017). We therefore included a measure of loneliness in Studies 1 and 2.

3.4 Study 1

3.4.1 Methods

Participants and procedure

Participants received invitations to complete an online survey by emails sent to participant panels at Liverpool, Oxford and Ulster universities. Ethical approval was obtained from the university ethics committees.

A total of 790 people participated in the survey, 254 males with a mean age of 27.57 years (*SD* = 15.48) and 536 females with mean age of 26.05 (*SD* = 11.76). 569 of the participants were students, 180 employed, and 24 not in employment (17 did not provide data). For the purpose of the present study, we excluded 222 participants who completed the survey in less than 15 minutes (a criterion suggested by Qualtrics, to ensure adequate attention to the questionnaires) and 35 participants who completed less than 50% of the items. Because of the cultural sensitivity of many of the items, we also excluded 37 participants those who were not born in the UK. The final sample was 496 participants (158 males, *M* = 28.97 years *SD*=13.75, and 338 females, *M* = 26.13 years, *SD* = 12.19).

Measures

The data considered here formed part of a multipurpose survey which included a wide range of questions on political, religious, social and other kinds of belief systems and relevant psychological constructs. Only those measures relevant to the present study are reported here but a list of the remaining measures is provided in the supplementary materials (Table 3.S1).

The Revised Paranoia and Deservedness Scale (PaDS –R) was designed on the basis of psychometric analyses of the original scale (Melo et al., 2009) in a large sample of healthy individuals and patients with psychosis (Elahi et al., 2017) and other recent findings indicating that paranoia consists of four elements: interpersonal sensitivity, mistrust, fear of persecution and ideas of reference (Bebbington et al., 2013). The revised scale consists of 8 paranoia items (the P scale), two each from these domains (e.g. respectively, "My friends often tell me to relax and stop worrying about being deceived or harmed", "You should only trust yourself", "I believe that some people want to hurt me deliberately", and "Sometimes I think there are hidden insults in things that other people say or do") and two additional deservedness items (the D scale) which were not used in the present study. Items are answered on a 5-point scale ranging from "*Strongly agree" to Strongly disagree*". In this sample, the eight-item P scale had an alpha coefficient of .87.

The Conspiracy Mentality Questionnaire (CMQ; Bruder et al., 2013) is a five item scale (e.g. "I think that many very important things happen in the world, which the public is never informed about") assessing participants' general tendency to believe in conspiracies. Responses are on 11-point scales indicating how likely it is that respondents think each of the items is true from 0 ("0% – Certainly not") to 10 ("100% – Certain"). The alpha coefficient in this sample was .84.

The Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991) was used to assess attachment style. Participants read four vignettes describing secure, fearful, preoccupied and dismissing prototypical styles and have to choose the one that describe them best. They

are then asked to rate each vignette "according to how well or poorly each description corresponds to your general relationship style" on 7-point scales from "*Disagree strongly*" to "*Agree strongly*". Scores on the four scales can be used to compute higher order measures of attachment anxiety (negative model of self) and attachment avoidance (negative model of other).

The Brief Core Schema Scale (BCSS; Fowler et al., 2006), developed originally to assess processes thought to be important in psychotic phenomena, measures four self-schematic constructs: negative beliefs about the self (e.g "I am unloved"), positive beliefs about the self (e.g. "I am respected"), negative beliefs about others (e.g. "Other people are hostile") and positive beliefs about others (e.g. "Other people are fair"), each with 6 items rated on 5-point scales ("*Don't' believe*" to "*Believe totally*"). In the present study, alpha coefficients for the four subscales ranged from .80 to .93.

The Multidimensional Locus of Control Scale (MLCS; Levenson, 1974) has three 8-item subscales: internality (e.g. "Whether or not I get to be a leader depends mostly on my ability"), chance (e.g. "When I get what I want, it's usually because I'm lucky") and powerful others (e.g. "My life is chiefly controlled by powerful others"). Each item is rated on a five-point scale from "*Strongly disagree*" to "*Strongly agree*". In the present sample, the internality subscale had an alpha of .64, the chance subscale had an alpha of .72 and the powerful others subscale had an alpha of .76.

The Loneliness Scale (Hughes et al., 2004) has three items (e.g. "How often do you feel left out?") answered on 3-point scales ("*Hardly ever*", "*Some of the time*", "*Often*"). In the present sample, the alpha coefficient was .83.

Statistical approach

First, confirmatory factor analyses (CFA) were conducted to compare two models: (1) a model in which all paranoia and conspiracy mentality items loaded on a single conspiracy/paranoia factor, and (2) a model in which paranoia and conspiracy mentality are separate but correlated latent variables. Second, after establishing that the two-factor was a better fit, we examined associations with subscales of each of the other psychological constructs of interest (attachment style, self-schemas, locus of control and loneliness). For this purpose we calculated a regression model in which all of the psychological constructs were entered simultaneously as predictors. In this model, conspiracy mentality (CMQ items) and paranoia (PaDS-R P items) were considered as latent factors, which were allowed to covary. This approach does not require us to partial out common and shared components of paranoia and conspiracist thinking but it does allow us to test for the specificity of the associations between constructs and belief systems. To achieve this, equality constraints were initially placed on the regression coefficients predicting the latent variables; these equality constraints were tested using Wald tests. If a Wald test was significant, the regression coefficients between the construct and paranoia and conspiracy theories were considered to be significantly different.

Confirmatory factor and regression models were conducted in Mplus 7.0 (Muthen & Muthen, 2013) with robust maximum likelihood estimation (MLR; Yuan & Bentler, 2000).

The following recommendations were followed to assess model fit (Hu & Bentler, 1998, 1999): a non-significant chi-square (χ^2), Comparative Fit Index (CFI: Bentler, 1990) and Tucker Lewis Index (TLI: Tucker & Lewis, 1973) values above .95 reflect excellent fit, while values for these two indices above .90 reflect acceptable fit; Root-Mean-Square Error of Approximation with 90% confidence intervals (RMSEA; Steiger, 1990) with values of .06 or less reflect excellent fit while values less than .08 reflect acceptable fit. The Standardized Root-Mean-Square Residual (SRMR; Chen, 2007) was also used with values of .06 or less indicating excellent fit and values less than .08 indicating acceptable fit. The Bayesian Information Criterion (BIC; Schwarz, 1978) was used to evaluate and compare models, with the smallest value indicating the best fitting model. In relation to the BIC, Raftery (1996) suggested that a 2-6 point difference offers evidence of model superiority, a 6-10 point difference indicates strong evidence of model superiority, and a difference greater than 10 points indicates very strong evidence of model superiority.

3.4.2 Results

The correlation matrix for the variables included in the study is shown in Table 3.1. The Pearson correlation between PaDS-R total scores and CMQ total scores was significant, r = .34, $p < .001$.

Table 3.1.

Study 1. Zero-Order Correlations [and 95% Confidence Intervals] between Paranoia, Conspiracy Theories, and psychological constructs.

Predictor Variables		1	2	3	4	5	6	7	8	9	10	11
1. Paranoia		_____										
2. Conspiracy Theories		.367** [.275,.454]	_____									
Attachment	3. Model of Self	-.476** [-.536, -.406]	-.125* [-.216, -.029]	_____								
	4. Model of Others	-.212** [-.304, -.116]	-.111 [-.209, -.007]	.092 [.024, .163]	_____							
Self-schemas	5. Positive Self	-289** [-.372, -.211]	-.015 [-.119, .081]	.306** [.224, .378]	.106* [.015, .192]	_____						
	6. Negative Self	.397** [.315, .474]	.015 [-.077, .119]	-.397** [-.470, -.325]	.089 [-.189, .007]	-.493** [-.562, .425]	_____					
	7. Positive Others	-.199** [-.301, -.102]	-.043 [-.152, .063]	.122* [.037, .216]	.219** [.125, .317]	.423** [.342, .496]	-.188** [-.283, -.095]	_____				
	8. Negative Others	.407** [.320, .495]	.256** [.146, .357]	-.232** [-.328, -.136]	-.003 [-.101, .094]	-.039 [-.133, .055]	.249** [.155, .339]	-.016 [-.141, .100]	_____			
Locus of control	9. Internality	-.120 [-.223, -.021]	-.028 [-.139, .099]	.179** [.081, .272]	.004 [-.090, .100]	.255** [.153, .356]	-.202** [-.286, -.120]	.210** [.092, .316]	-.141** [-.242, -.039]	_____		
	10. Chance	.413** [.331, .488]	.222** [.124, .316]	-.247** [-.334, -.154]	-.048 [-.172, .072]	-.102* [-.199, -.002]	.259** [.169, .352]	-.022 [-.134, .084]	.242** [.156, .332]	-.088 [-.202, .037]	_____	
	11. Powerful Others	.342** [.251, .430]	.223** [.117, .319]	-.228** [-.321, -.128]	-.001 [-.097, .093]	-.104* [-.208, .001]	.230** [.114, .339]	-.118* [-.227, -.007]	.204** [.109, .310]	.002 [-.127, .127]	.528** [.439, .611]	_____
12. Loneliness		.537** [.466, .603]	.148** [.061, .245]	-.500 [-.570, -.421]	-.219** [-.300, -.129]	-.342** [-.430, -.251]	.499** [.414, .573]	-.224** [-.309, -.138]	.305** [.207, .397]	-.176** [-.271, -.084]	.259** [.166, .343]	.248** [.157, .340]

Note: ** p < .01 * p < .05

Model fit for paranoia and conspiracy theories

The model fit indices for the initial confirmatory factor models, which included only the PaDS-R P and CMS items, showed that the two factor model provided acceptable fit (χ^2 (64) = 204.888, p > .05; *RMSEA* = .068; *CFI* = .934; *TLI* = .919, *SRMR* = .046) and the one factor model did not (χ^2 (65)=844.474, p >.05; *RMSEA* = .158; *CFI* = .634; *TLI* = .561, *SRMR* = .126). The BIC was also lower for the two factor model (*BIC* = 21590.384) compared to the one factor model (*BIC* = 22300.743) and the difference was much greater than 10 points and so indicates very strong evidence of the superiority of the two factor model. The standardised factor loadings for the paranoia and conspiracy mentality latent variables were all high, positive and statistically significant ranging from .520 to .858, and the correlation between the latent variables was .417. The composite reliability (Raykov, 1997) for paranoia (*CR* = .870) and conspiracy mentality (*CR* = .841) were high.

Associations between paranoia, conspiracy theories and psychological constructs

Bivariate correlations and partial correlations (controlling for the other belief system) between paranoia and conspiracy mentality and each of the psychological constructs are shown in the supplementary materials Table 3.S2.

Table 3.2 shows the regression coefficients and Wald tests for our regression model. Both anxious attachment (model of self) and avoidant attachment (model of other) were associated with both belief systems, but the effect of anxious attachment was much greater for paranoia than conspiracy mentality. Paranoia was associated with low positive beliefs about the self and high negative beliefs about the self but both systems were associated with negative beliefs about others; the effect for negative beliefs about the self was

significantly greater for paranoia than conspiracy mentality. As expected, two of the locus of control subscales – chance and powerful others – were associated with both belief systems, although the effect of chance was greater for paranoia. An association with internality was only found for paranoia although this was not significantly greater than the non-association found for conspiracist thinking. Finally, although both belief systems were associated with loneliness, the effect was much stronger for paranoia.

Table 3.2.

Study 1 standardised regression coefficients and tests of equality from multivariate regression model predicting paranoia and conspiracy beliefs.

Predictor Variables		Paranoia β (se)	Conspiracy β (se)	Wald	df	p
Attachment	Model of Self	-.422 (.035) *	-.120 (.045) *	45.508	1	< .001
	Model of Other	-.153 (.043) *	-.125 (.046) *	0.306	1	.580
Self-esteem	Positive self	-.122 (.051) *	-.037 (.060)	1.881	1	.170
	Negative self	.209 (.051) *	-.073 (.056)	30.545	1	< .001
	Positive other	-.093 (.050)	-.059 (.051)	0.450	1	.502
	Negative other	.339 (.045) *	.283 (.047) *	1.461	1	.227
Locus of Control	Internality	-.099 (.048) *	-.013 (.051)	2.746	1	.098
	Chance	.299 (.052) *	.171 (.060) *	4.664	1	.031
	Powerful Others	.174 (.052) *	.139 (.058) *	0.430	1	.512
Loneliness		.501 (.039) *	.152 (.047) *	53.968	1	< .001
R-squared		.456 (.036) *	.152 (.031) *	27.019	1	<. 001

Note: * p < .05

3.4.3 Study 1 Discussion

This study found evidence that paranoia and conspiracist thinking, although correlated to approximately the same extent found in previous studies (Imhoff & Lamberty, 2018), appear to be distinct phenomena. a model with two correlated factors (i.e., paranoia and conspiracy theories) was a far better fit to the data than a single factor model. The two systems showed differential associations with some psychological constructs but not others:

attachment anxiety, negative beliefs about the self, loneliness and (marginally) internality were more associated with paranoia, consistent with Imhoff and Lamberty's (2018) account of the difference between the two systems and also with psychological models of paranoia which emphasize the role of low self-esteem and interpersonal sensitivity (Bentall et al., 2001; Freeman, 2016). The strong association between paranoia and loneliness observed in the present study has been observed in a previous study with a student sample (McIntyre et al., 2018).

The study had several limitations. First, the primarily student sample was unrepresentative of the general population. Hence, we decided to attempt to replicate our findings with a larger, more diverse and more representative sample. Second, our conspiracy mentality measure was a short assessment of the tendency to believe in conspiracies in general, so that participants did not have to rate the plausibility of specific conspiracy theories; we decided to replace it with a scale that does. Third, the BCSS, which we used to measure self-schemas, was originally designed for the purposes of research into psychosis and we therefore replaced it with a more conventional measure of self-esteem. Finally, we included an expanded version of Frederick's (2005) Cognitive Reflection Test (CRT) as a measure of analytic thinking/cognitive miserliness.

3.5 Study 2

3.5.1 Methods

Participants and procedure

Participants were recruited to be a close to representative national sample by the survey company Qualtrics, and were stratified by age (minimum age 18 years; approximately equal numbers from age bands 18-24; 25-34; 35-44; 45-49; 50-64; 65+), sex and household income (approximately equal numbers from quintiles defined on the basis of Office for National Statistics data (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyearending2016): £0-599; £600-1,155; £1,156-2,247; £2,248-£3,604; £3,605-£7.061; £7,062 and above). 1,852 UK residents attempted the survey but, after removal of incomplete surveys or surveys completed implausibly quickly (pre-defined following pilot work by the survey company as < 12 minutes) the final sample was 1,508.

Of these, 742 were male with a mean age of 50.57 years (*SD* = 18.12) and 766 were female with a mean age of 45.04 years (*SD* = 15.64). 1440 were British nationals and 68 had other nationality.

Measures

The data for this study were again drawn from a multipurpose survey and all additional measures are listed in the supplementary materials (Table 3.S1). The following measures were identical to those used in Study 1: *Revised Paranoia and Deservedness Scale* (in this

study, α = .91); *The Relationship Questionnaire*; The *Multidimensional Locus of Control Scale* (alphas for internality = .75; chance = .82; powerful others = .85); and the *Loneliness Scale* (α = .88). The following additional measures were used:

Generic Conspiracist Beliefs Scale (GCBS; Brotherton et al., 2013) is a 17-item scale (e.g., "Evidence of alien contact is being concealed from the public" and "Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public")[1]. Responses are rated on 5-point scales ("*Definitely not true*" to "*Definitely true*"). The alpha coefficient for the scale was .94.

Self-esteem rating scale short form (SERS; Lecomte et al., 2006) is a 20-item scale, designed to assess self-esteem without scores being contaminated by mood which, in confirmatory factor analyses with both nonclinical and clinical (severe mental illness) samples, has been shown to yield two negatively correlated subscales, positive self-esteem (10 positive statements about the self, e.g. "I feel good about myself") and negative-self-esteem (10 negative statements about the self, e.g. "I feel that others do things much better than I do"). Participants rate each statement from 1, '*never*', to 7, '*always*'. In this study, α = .94 for positive self-esteem and .94 for negative self-esteem.

[1] This version of the scale included two additional items based on the work of Wood et al. (2012) designed to test whether people high on conspiracy mentality would endorse mutually contradictory conspiracy theories: "Princess Diana faked her death so that she could retreat into isolation" and "Princess Diana had to be killed because the British government could not accept that the mother of a future king was involved with a Muslim Arab".

Cognitive Reflection Test (CRT; Frederick, 2005) is a 3-item scale which requires an answer to mathematical questions, in which the structure of the question implied the wrong answer, so that the correct answer requires effortful reflection and 'cognitive miserliness' leads to wrong answer e.g. "A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?". A second version of the scale, the CRT-2 (Thomson & Oppenheimer, 2016) included a 4-item scale with a lower degree of mathematical complexity, e.g. "A farmer had 15 sheep and all but 8 died. How many are left?" and we combined both measures to make a 7-item scale. Participants typed their answers into a textbox. To ensure that the participants answered the questions quickly, only 30 seconds from the moment of presentation was allowed for each answer, after which the questionnaire automatically moved to the next item. The alpha coefficient for 1,235 who completed all 7 items was .71.

3.5.2 Results

Zero-order correlations between the study variables are shown in Table 3.3. In this study, the correlation between the summed scores on the PaDS-R and our conspiracy measure, the GCBS[2], was .44, $p < .001$.

[2] Replicating Wood et al. (2012), a positive correlation was found between participants' ratings of the plausibility of the two contradictory conspiracy theories, "Princess Diana faked her own death so that she could retreat into isolation" and "Princess Diana was killed because the British government could not accept that the mother of the future king was involved with a Muslim Arab", $r = .39$, $p < .001$.

Table 3.3.

Study 2 Zero-Order Correlations [and 95% Confidence Intervals] between Paranoia and Conspiracy Mentality and psychological constructs.

Predictor Variables		1	2	3	4	5	6	7	8	9	10
1. Paranoia		_____									
2. Conspiracy Theories		.433** [.382, .490]	_____								
Attachment	3. Model of Self	-.413** [-.458, -.365]	-.143** [-.197, -.085]	_____							
	4. Model of Others	-.178** [-.235, -.123]	.034 [-.026, .093]	.183** [.124, .240]	_____						
Self-schemas	5. Positive	-.244** [-.308, -.181]	.055 [-.014, .117]	.325** [.267, .382]	.213** [.153, .271]	_____					
	6. Negative	.739** [.711, .763]	.345** [.289, .400]	-.409** [-.456, -.359]	-.084** [-.137, -.029]	-.268** [-.343, -.198]	_____				
Locus of control	7. Internality	-.035 [-.099, .031]	.064* [-.002, .120]	.183** [.130, .234]	.094** [.041, .145]	.490** [.429, .547]	-.115** [-.183, -.054]	_____			
	8. Chance	.529** [.477, .578]	.426** [.370, .480]	-.240** [-.288, -.190]	-.053 [-.113, .005]	.008 [-.059, .073]	.505** [.449, .559]	.227** [.150, .293]	_____		
	9. Powerful Others	.556** [.509, .602]	.418** [.362, .471]	-.278** [-.328, -.221]	-.030 [-.083, .024]	-.037 [-.104, .033]	.552** [.497, .602]	.236** [.171, .296]	.787** [.757, .817]	_____	
10. Loneliness		.588** [.550, .625]	.281** [.229, .332]	-.406** [-.452, -.359]	-.132** [-.188, -.077]	-.341** [-.396, -.284]	.620** [.582, .659]	-.142 [-.202, -.089]	.345** [.296, .396]	.355** [.304, .405]	_____
Cognitive Reflection Test	11. Number correct	-.095** [-.151, -.043]	-.233** [-.286, -.182]	.023 [-.033, .076]	-.041 [-.100, .016]	-.057* [-.111, -.003]	-.091** [-.151, -.034]	-.037 [-.091, .027]	-.111** [-.164, -.058]	-.097** [-.150, -.040]	-.033 [-.092, .032]

Note: ** p < .01 * p < .05

Model fit for paranoia and conspiracy theories

The model fit indices for the CFA models which included the PaDS-R P and GCBS items showed that the two factor model provided acceptable fit (χ^2 (274) = 2169.513, *p* >.05; *RMSEA* = .067; *CFI* = .892; *TLI* = .882, *SRMR* = .051) and the one factor model did not (χ^2 (275) = 5816.359, *p* >.05; *RMSEA* = .115; *CFI* = .685; *TLI* = .657, *SRMR* = .120). The BIC was also lower for the two-factor model (*BIC* = 102145.63) compared to the one factor model (*BIC* = 107084.68) and indicates very strong evidence of the superiority of the two factor model. The standardised factor loadings for the paranoia and conspiracy mentality latent variables were all high, positive and statistically significant ranging from .488 to .842, and the correlation between the latent variables was .459. The composite reliability (Raykov, 1997) for the paranoia (*CR* = .907) and conspiracy mentality (*CR* =.947) were high.

Associations between paranoia, CTs and psychological constructs

Bivariate associations and partial correlations between the belief system variables and psychological constructs are shown in the supplementary materials (Table 3.S3).

The regression model and Wald tests of whether the predictor variables are differentially associated with the two types of belief systems are shown in Table 3.4. In general, the patterns of association are similar to those observed in Study 1, but with higher significance. Both insecure attachment styles are associated with paranoia and not conspiracy theories. Paranoia is strongly associated positively with negative self-esteem whereas, for conspiracy theories, the association is trivial. Only CTs are positively associated with positive self-esteem. For the locus of control subscales, both types of belief systems are positively associated with belief in powerful others and chance, although the association

for chance is greater for conspiracy theories than for paranoia (the reverse was the case in Study 1); only conspiracy theories are associated with low internality scores (in Study 1 paranoia was associated with low internality).

Table 3.4.

Study 2 standardised regression coefficients and tests of equality from multivariate regression model predicting paranoia and conspiracy beliefs.

Predictor Variables		Paranoia β (se)	Conspiracy β (se)	Wald	df	p
Attachment	Model of Self	-.069 (.022) *	.004 (.030)	5.778	1	.016
	Model of Other	-.092 (.020) *	.040 (.026)	20.571	1	< .001
Self-esteem	Positive	-.024 (.025)	.145 (.033) *	19.247	1	< .001
	Negative	.461 (.031) *	.081 (.039) *	63.389	1	< .001
Locus of Control	Internality	.022 (.025)	-.080 (.030) *	9.214	1	.002
	Chance	.111 (.032) *	.202 (.043) *	4.576	1	.032
	Powerful Others	.116 (.034) *	.175 (.045) *	1.636	1	.201
Loneliness		.180 (.026) *	.146 (.034) *	0.736	1	.391
Cognitive Reflection Test	Correct	-.025 (.019)	-.173 (.024) *	33.788	1	< .001
R-squared		.620 (.017) *	.274 (.024) *	146.534	1	< .001

Note: $p<.05$*

Loneliness is equally associated with both belief systems whereas conspiracy theories are uniquely associated with miserly analytical thinking as measured by the CRT.

3.5.3 Study 2 Discussion

Replicating Study 1 and previous studies (Imhoff & Lamberty, 2018), paranoia and belief in conspiracy theories, although correlated, were best modelled as two separate constructs. Also replicating Study 1, paranoia was more closely associated than belief in

conspiracies with psychological constructs indicative of interpersonal vulnerability, specifically insecure attachment and negative beliefs about the self. Both chance and powerful others locus of control were associated with both belief systems, again as in Study 1; the inconsistent findings of internality (negatively associated with paranoia in Study 1 but with conspiracy theories in Study 2) should be interpreted in the context of the small magnitude of the effects in both studies. As in Study 1, both paranoia and conspiracy theories were associated with loneliness but the effect for paranoia was much less, perhaps reflecting the fact that Study 2 employed a sample that was much more representative of the general population.

The finding that poor performance on the CRT was specifically related to belief in conspiracy theories is striking. Previous studies have reported that impaired analytic thinking is associated with both belief systems (Bronstein et al., 2019; van Prooijen, 2017) but no previous study has considered both belief systems together.

Although Study 2 represented a methodological advance on Study 1, particularly in terms of the sample, we decided to conduct a third study to address some remaining questions. The first concerned a potential methodological limitation affecting both Study 1 and Study 2. We wondered whether the superiority of a two-factor model over a single factor model of paranoia and belief in conspiracy theories could reflect a method effect related to item format. Items in both the Conspiracy Mentality Scale employed in Study 1 ("I think that many very important things happen in the world, which the public is never informed about") and Generic Conspiracist Beliefs Scale employed in Study ("Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public") required participants to indicate their agreement with specific propositions about events in the world where as some of the Items in the Paranoia and Deservedness Scale ("My friends

often tell me to relax and stop worrying about being deceived or harmed") less directly assessed beliefs and include affective elements. We therefore created a new paranoia scale, with exactly the same response format as the GCBS, in which each item was entirely propositional.

Second, although both Studies 1 and 2 showed a specific association between insecure attachment and paranoia, the scale we used to measure attachment, the Relationship Questionnaire, was not that used by Green and Douglas (2018) in their study showing an effect of attachment insecurity on conspiracy theories; in Study 3 we therefore used a brief version of the Experiences in Close Relationships Scale (ECR-12; Lafontaine et al., 2015) employed in their study.

Third, we sought to replicate our finding that impaired performance on the CRT is specifically associated with belief in conspiracy theories. Finally, given previous findings that belief in conspiracy theories is associated with narcissism (Cichocka et al., 2016; de Zavala & Fredrico, 2018) we included a narcissism measure.

3.6 Study 3

3.6.1 Methods

Participants and procedure

Participants were recruited by the survey company Qualtrics using the same sampling frame employed in Study 2, with participants stratified by sex, age and household income. A total of 722 UK residents attempted the survey but, after removal of incomplete surveys or surveys completed implausibly quickly (pre-defined following pilot work by the survey company as < 15 minutes) the final sample was 638. Of these, 296 were male with a mean age of 46.60 years (*SD* = 15.83) and 342 were female with a mean age of 43.77 years (*SD* = 16.16).

Measures

The data for this study were again drawn from a multipurpose survey and all additional measures are listed in the supplementary materials (Table 3.S1). The following measures were identical to those used in Study 1: The *Multidimensional Locus of Control Scale* (alphas in this study for internality = .79; chance = .84; powerful others = .86); the *Self-Esteem Rating Scale* (alphas for positive self = .94; negative self = .95). The study also used the 15-item of the *Generic Conspiracist Beliefs Scale* employed in Study 2 (alpha = .96)[3].

The revised *Paranoia Scale* designed especially for this study was based on the PaDS employed in Studies 1 and 2, but items were rewritten so that each contained a specific

[3] The two additional items from Study 2 designed to assess contradictory CTs based on the work of Wood et al., (2012) were not included.

proposition formatted similarly to the items of the GCBS, and with an identical response format. There were two items for each of the domains identified by Bebbington et al. (2013): interpersonal sensitivity ("There is a risk that I will be criticised or rejected in social situations"); mistrust ("You should only trust yourself"); ideas of reference ("When I am out in public, people sometimes talk about me") and fear of persecution ("Some people want to hurt me deliberately"). Coefficient alpha for the scale was .85.

Cognitive Reflection Test (CRT; Fredrick, 2005) was expanded to include 4-items from (Toplak et al., 2014) and 3-items from (Thomson & Oppenheimer, 2016). This version used the four-option multiple choice format with choices presented in random order as recommended by Sirota and Juanchich (2018); 45 seconds was allowed for each answer, after which the questionnaire automatically moved to the next item. The alpha coefficient for 597 who completed all 10 items was .70.

A brief version of the Experiences in Close Relationships Scale (ECR-12; Lafontaine et al., 2015) is a 12-item scale used for the assessment of two attachment styles: attachment anxiety (e.g. "I worry that others won't care about me as much as I care about them") and avoidant attachment (e.g. "I feel comfortable depending on others"). Responses are rated on 7-point scale, from ("*strongly disagree*" to "*strongly agree*"). The alpha coefficient for anxious attachment was .87 and for avoidant attachment was .77.

The Narcissistic Personality Inventory (NPI-13; Gentile et al., 2013) has 13-items in which participants are presented with pairs of attributes in each item and have to choose the one they most agree with (e.g. “A- I find it easy to manipulate people. B- I don’t like it when I find myself manipulating people”). For scale scoring, item A should be coded as 0 while item B should be coded as 1. Then reverse the coding for items number 1, 3, 4, 6, 7, 10, 12 and 13. And to get the total score sum the reversed items with items number 2, 5, 8, 9 and 11. The alpha coefficient for the scale was .77.

3.6.2 Results

Zero-order correlations between the study variables are shown in Table 3.5. In this study, the correlation between the summed scores on the paranoia and the conspiracy measures, was .50, $p < .001$.

Table 3.5.

Study 3. Zero-Order Correlations [and 95% Confidence Intervals] between Paranoia and Conspiracy Mentality and psychological constructs.

Predictor Variables		1	2	3	4	5	6	7	8	9	10
1. Paranoia		_____									
2. Conspiracy Theories		.503** [.433, .569]	_____								
Attachment	3. Avoidant Attachment	.034 [-.041, .122]	.018 [-.063, .101]	_____							
	4. Attachment Anxiety	-.008 [-.089, .075]	.033 [-.044, .117]	-.158** [-.241, -.062]	_____						
Self-schemas	5. Positive	-.055 [-.149, .039]	.033 [-.055, .120]	-.035 [-.116, .053]	.041 [-.036, .117]	_____					
	6. Negative	.454** [.369, .530]	.437** [.360, .512]	.028 [-.084, .110]	-.020 [-.111, .068]	-.206** [-.305, -.108]	_____				
Locus of control	7. Internality	.117** [.011, .222]	.068 [-.031, .158]	-.024 [-.111, .062]	-.020 [-.101, .062]	.462** [.376, .537]	-.010 [-.120, .096]	_____			
	8. Chance	.410** [.318, .502]	.454** [.368, .536]	-.017 [-.098, .061]	-.039 [-.119, .041]	-.024 [-.130, .071]	.552** [.479, .622]	.299** [.191, .394]	_____		
	9. Powerful Others	.433** [.335, .518]	.459** [.368, .540]	-.024 [-.111, .057]	-.024 [-.097, .048]	-.050 [-.153, .051]	.612** [.541, .672]	.303** [.194, .399]	.791** [.746, .832]	_____	
10. Narcissism		.212** [.139, .284]	.313** [.242, .381]	-.013 [-.094, .064]	.037 [-.046, .120]	.234** [.160, .304]	.264** [.185, .346]	.073 [-.014, .161]	.111** [.012, .209]	.170** [.073, .262]	_____
Cognitive Reflection Test	11. Number correct	-.094* [-.175, -.019]	-.273** [-.340, -.191]	-.055 [-.130, .021]	.040 [-.049, .129]	-.106** [-.186, -.028]	-.127** [-.201, -.049]	.035 [-.039, .114]	-.059 [-.136, .018]	-.027 [-.095, .040]	-.168** [-.244, -.088]

Note: ** p < .01 * p < .05

Model fit for paranoia and conspiracy theories

The model fit indices for the CFA models which included the Revised Paranoia Scale and GCBS items showed that the two factor model provided acceptable fit (χ^2 (229) = 813.70, $p < .001$; *RMSEA* = .063; *CFI* = .913; *TLI* = .904, *SRMR* = .055) whereas the one factor model did not (χ^2 (230) = 1656.88, $p < .001$; *RMSEA* = .099; *CFI* = .788; *TLI* = .767, *SRMR* = .097). The BIC was also lower for the two-factor model (*BIC* = 38336.09) compared to the one factor model (*BIC* = 39508.56), providing strong evidence of the superiority of the former. The standardised factor loadings for the paranoia and conspiracy mentality latent variables were all positive and statistically significant ranging from .302 to .837, and the correlation between the latent variables was .530. The composite reliability (Raykov, 1997) for paranoia (*CR* = .855) and conspiracy beliefs (*CR* =.956) were high.

Associations between paranoia, conspiracy theories and psychological constructs

Bivariate associations and partial correlations between the belief system variables and psychological constructs are shown in the supplementary materials (Table 3.S4). The regression model and Wald tests of whether the predictor variables are differentially associated with the two types of belief systems are shown in Table 3.6.

Table 3.6.

Study 3 standardised regression coefficients and tests of equality from multivariate regression model predicting paranoia and conspiracy beliefs.

Predictor Variables		Paranoia β (se)	Conspiracy β (se)	Wald	df	p
ECR-12 Attachment	Attachment Avoidance	.030(.052)	.006(.051)	0.075	1	.785
	Attachment Anxiety	-.024(.048)	.048(.048)	0.698	1	.404
Self-esteem	Positive	-.157(.054) *	.130(.052) *	9.841	1	.002
	Negative	.379(.045) *	.222(.045) *	4.300	1	.038
Narcissism		.070(.045)	.268(.042) *	5.974	1	.015
Locus of Control	Internality	.074(.050)	.018(.051)	0.494	1	.482
	Chance	.233(.048) *	.321(.045) *	0.893	1	.344
	Powerful Others	.273(.043) *	.303(.044) *	0.061	1	.806
Cognitive Reflection Test	Correct	.089(.051)	-.332(.052) *	18.428	1	< .001
R-squared		.300(.033) *	.371(.032) *	0.146	1	.703

Note: * p < .05

The results for self-esteem and locus of control were broadly consistent with the previous studies, with negative self-esteem associated with paranoia (with a significantly less but nonetheless significant effect for conspiracy theories), positive self-esteem associated positively with conspiracy theories but negatively with paranoia, and the chance and powerful others locus of control variables associated with both belief systems. Importantly, as predicted on the basis of previous research (e.g. Chichoka et al., 2016), narcissism was specifically associated with conspiracy theories and, consistent with the findings from Study 2, poor analytic thinking was also specifically associated with conspiracy theories.

Contrary to prediction there was no association between either of the ECR attachment measures and either of the two belief systems.

3.6.3 Study 3 Discussion

The general picture that emerged from this study is consistent with the findings from the two previous studies. A two factor CFA model was the best fit to the data, despite our assiduous efforts to eliminate possible method effects. Negative self-esteem had a greater association with Paranoia compared with its association with conspiracy theories. The observation that conspiracy theories were specifically associated with narcissism is consistent with previous studies (Cichocka et al., 2016; de Zavala & Fredrico, 2018), and helps to explain the association also observed with positive self-esteem. We discuss this finding and also the replicated finding of a specific association between conspiracy theories and poor analytical thinking in the general discussion below. The major unexpected finding from this study was the lack of association between either belief system or the two attachment scales. This is unlikely to be an artefact of our analytic approach as inspection of Table 3.S3 in the supplementary materials indicated that all the relevant bivariate correlations were close to zero.

3.7 General Discussion

In this paper, we have reported three studies of the relationship between paranoia and conspiracy theories, one with a largely student population and two with larger samples that were much more representative of the UK population. Many, although not all of the results were broadly consistent across the studies.

In all three studies we found that paranoia and conspiracist thinking, although correlated to a similar extent found in previous studies (Imhoff & Lamberty, 2018), were separable psychological phenomena. In our confirmatory factor analyses, models with two correlated factors were consistently far better fits to the data than single factor models. This finding was upheld despite the fact that, across the three studies, we employed two separate measures of conspiracist thinking (the Bruder et al., 2013 *Conspiracy Mentality Questionnaire* and Brotherton et al's., 2013 *Generic Conspiracist Beliefs Scale*) and two measures of paranoia (a version of Melo et al's., 2009 *Persecution and Deservedness Scale* and a revised version of the scale designed especially for this research) and despite the fact that we made assiduous attempts to eliminate potential method effects in the final study.

Table 3.7.

Summary of associations between paranoia and belief in conspiracy theories and psychological constructs in Studies 1 – 3. Upper row for each construct shows direction of association (positive, negative, or not significant) and lower row shows whether a significant difference between paranoia and conspiracies. Note that this table does not show the magnitude of the effects.

		Study 1		Study 2		Study 3	
		Paranoia	**CTs**	**Paranoia**	**CTs**	**Paranoia**	**CTs**
Attachment	**Anxious**	+	+	+	ns	ns	ns
		P>C		P>C		No difference	
	Avoidant	+	+	+	ns	ns	ns
		No difference		P>C		No difference	
Self-esteem	**Positive**	-	ns	ns	+	-	+
		C>P		C>P		C>P	
	Negative	+	ns	+	ns	+	+
		P>C		P>C		P>C	
Narcissism						ns	+
						C>P	
Locus of control	**Internality**	-	ns	ns	-	ns	ns
		No difference		P>C		No difference	
	Chance	+	+	+	+	+	+
		P>C		C>P		No difference	
	Powerful others	+	+	+	+	+	+
		No difference		No difference		No difference	
Cognitive reflection (errors)				ns	+	ns	+
				C>P		C>P	
Loneliness		+	+	+	+		
		P>C		No difference			

The findings on the relationships between the two types of belief and our psychological constructs are summarised in Table 3.4, and as would be expected for distinct but correlated phenomena, these point to both common and specific factors. The most striking common factor is that both are associated with an external locus of control and, specifically, the belief that life is dominated by chance factors and the actions of powerful

others. These findings are broadly consistent with the results from previous studies of paranoia (e.g., Kaney & Bentall, 1989) and conspiracy theories (e.g., van Prooijen & Acker, 2015) and can be understood in the context of research that has shown that experiences of low control lead to belief system justification and more extreme attitudes (Kay et al., 2008; Kay & Eibach, 2013).

Both belief systems were also associated with loneliness although, in one study (Study 1, with the least representative sample), this effect was greater for paranoia. Despite some inconsistencies, the remaining findings support our hypothesis, and that of previous researchers (Imhoff & Lamberty, 2018), that paranoia is specifically associated with interpersonal vulnerability. This is particularly evident in the self-esteem data, for which, across all three studies, paranoia is associated with high negative self-esteem and low positive self-esteem and, less consistently, in the attachment data.

Our findings for paranoia and negative self-esteem are consistent with a large number of previous studies that have employed nonclinical and clinical samples (Tiernan et al., 2014). By contrast, in the two studies reported here that included the most representative samples, we observed positive associations between positive self-esteem and belief in conspiracy theories and, in the final study, also a positive association between conspiracy theories and narcissism. Reviewing previous studies of conspiracy theories and self-esteem, Cichocka et al., (2016) noted that findings had been inconsistent, leading them to propose that conspiracy theories are associated with an excessive sense of self-worth linked to narcissism; in three studies they observed the predicted association between narcissism and conspiracy theories, which we replicated in our Study 3, but they also found that self-esteem alone was not associated with conspiracist thinking. An important difference in our studies is that we chose scales that distinguished between positive and

negative self-esteem whereas previous studies, including those by Cichocka et al., (2016) used unidimensional scales. Our choice partly reflected our clinical background in which the distinction is meaningful in the context of psychopathological states; although historically it has been contested (Marsh, 1996) the distinction has been supported in factor analytic investigations of both the Core Self-Schema Scale used in Study 1 (Fowler et al., 2006) and the Self-Esteem Rating Scale (Lecomte et al., 2006) used in Studies 2 and 3. Overall, our findings are therefore consistent with Cichocka et al's., (2016) hypothesis that conspiracy theories are associated with an inflated sense of self-worth.

Previous research has repeatedly reported robust associations between insecure (especially anxious) attachment and paranoia in both healthy and clinical (psychosis) samples (e.g. Pickering et al., 2008; Wickham et al., 2015); a recent systematic review found that 11/12 clinical studies observed this effect (Lavin et al., 2019). Two studies have reported a similar association with conspiracy theories (Freeman & Bentall, 2017; Green & Douglas, 2018). In two of the present studies, including Study 2 which had the largest and most representative sample, anxious attachment was more highly associated with paranoia than conspiracy theories and, in one, the avoidant style was also more highly associated with paranoia. This picture is complicated by the results of Study 3, which used Lafontaine et al.'s, (2015) short version of the Experience of Close Relations Scale rather than Bartholomew and Horowitz's (1991) Relationship Scale employed in Studies 1 and 2, and in which no association was observed between either anxious or avoidant attachment and either paranoia or conspiracy theories. It is unlikely that the change of scale can explain these null results, as the two previous studies that have reported associations between attachment and conspiracy theories used an earlier variant of the RQ (Freeman & Bentall, 2017) and a variant of the ECR (Green & Douglas, 2018). We therefore frankly state that we

have no explanation for the null results for attachment in Study 3. However, on balance, both in the existing literature and the studies reported here, insecure attachment, especially of the anxious variety, seems more clearly associated with paranoia than with conspiracist thinking.

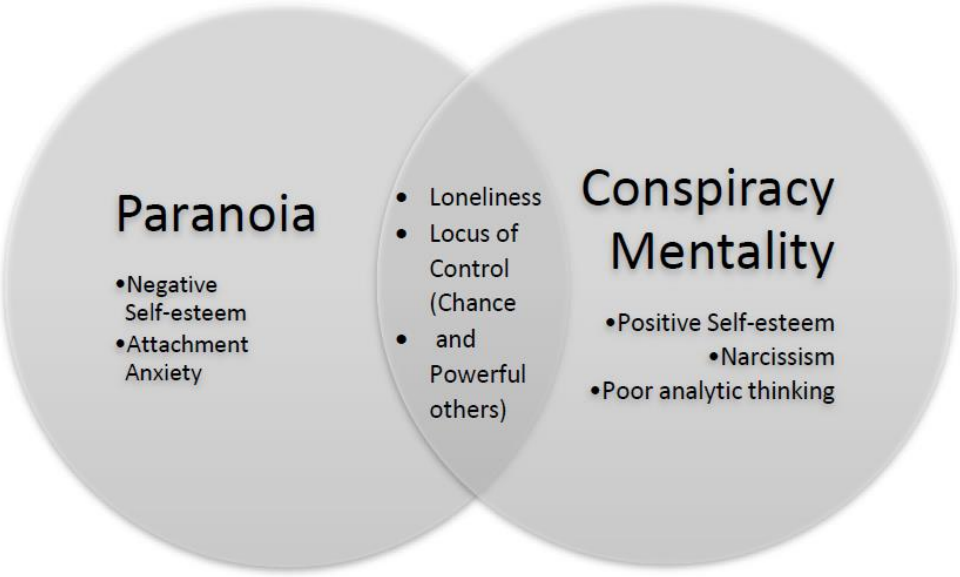
Finally, we included versions of the Fredrick's (2005) Cognitive Reflection Test in two of our studies and, against expectation, in both found evidence that poor performance was associated with conspiracy theories but not paranoia. This observation is striking given that clinical paranoia is associated with poor performance on cognitive tests related to executive function (Bentall et al., 2009), and that poor analytic reasoning strongly predicts the 'jumping-to-conclusions' data gathering bias (Ross et al., 2016) which has been widely replicated in deluded patients (Dudley et al., 2016). A possible explanation is that paranoid beliefs are typically idiosyncratic whereas other kinds of strong beliefs, including conspiracy theories, are typically shared and transmitted socially (Bentall, 2018). It has been argued that one feature of conspiracy theories is that they can usually be rejected by reflection and simple thought experiment (Aaranovitch, 2009); for example, faking the Moon landing would require 46,000 NASA employees to repeat the same lie for decades, something which, arguably, would be more difficult to engineer than actually going to the Moon. One function of analytic thinking is the detection of implausible or pseudo-profound ideas (Pennycook et al., 2015) and fake news (Bronstein et al., 2019), a skill that is possibly less likely to impact on the evaluation of self-generated beliefs than on the evaluation of theories transmitted from others.

We acknowledge some limitations of the studies reported here. Although the reliability coefficient of most of the scales in this study were good, the locus of control subscales had only moderate reliability. The sample in Study 1 was not representative of the

general population. Although Studies 2 and 3 were much more representative of the British population (and larger than any previous studies addressing the relationship between the two belief systems), and although the correlations we observed in our data were similar to those observed in studies in North America and continental Europe, generalizability to other countries and cultures should not be assumed. Indeed, it seems very likely that both belief systems will vary with personal, economic and historical circumstances. In the case of paranoia, there is considerable evidence that early life adversity plays an important role (Bentall et al., 2015). The observation that belief in conspiracy theories can be reinforced by loss of control experiences (van Prooijen & Acker, 2015) suggests a mechanism by which economic threats can lead to conspiracist thinking. Finally, it is important to note that all three studies were cross sectional.

Figure 3.1.

Conceptual diagram showing relationship between paranoia and conspiracy mentality in relation to relevant psychological constructs.



A heuristic model that synthesizes the findings from the studies is shown in Figure 3.1. It should be noted that this model is structural, identifying common and specific psychological features of paranoia and conspiracy theories, and we make no strong claims about the causal role of the psychological processes identified. However, some findings relevant to this issue have been reported in previous studies. For example, it has been shown that changes in negative self-esteem predict changes in paranoia in the short (Thewissen et al., 2008) and long-term (Fowler et al., 2012) and that priming uncertainty exacerbates belief in conspiracy theories in the short term (van Prooijen & Acker, 2015). Further experimental and longitudinal studies are required to explore the role of common and specific psychological mechanisms in causing paranoia and conspiracy theories.

Chapter 4: Atheism Is Not the Absence of Religion: Development of the Monotheist and Atheist Belief Scales and Associations with Death Anxiety and Analytic Thinking

4.1 Abstract

Many previous studies have assumed that atheism is the absence of religious belief or lies at one end of a spectrum of religiosity. In the philosophical literature, however, atheism is a positive belief system. This paper describes two online studies that tested whether atheism and religion are separate, negatively correlated belief systems. In study 1 (*N* = 488, 206 male, *M* = 31.7 years, a convenience sample recruited via Twitter), we designed a scale (the Monotheist and Atheist Beliefs Scale [MABS]) to measure religious and atheistic beliefs and used exploratory factor analysis to identify its structure. In study 2 (*N* = 638, UK population, representative sample, 296 male, *M* = 45.0 years, recruited by the survey company Qualtrics), we tested the structure of the MABS with confirmatory factor analysis and studied its associations with analytic thinking (using the Cognitive Reflection Test [CRT]) and death anxiety in analyses in which religiosity was treated as unidimensional and in which religiosity and atheism were treated as separate. Data from both studies supported a two-factor model. In contrast to previous studies showing that atheists are superior at analytic thinking, we found that the CRT scores were negatively associated with religious belief but had no relationship with atheistic belief. In contrast to previous studies showing a curvilinear relationship between death anxiety and religiosity, we observed that death anxiety was linearly associated with religious belief but was not associated with atheistic belief. The MABS is a useful instrument for future research.

4.2 Introduction

Despite the commercial success of a number of popular books advocating atheism, for example by the British evolutionary biologist Richard Dawkins (2006) and the American philosopher Sam Harris (2004), psychological research on the topic is sparse. A 2014 survey of the scholarly literature found only 100 papers on the psychology of atheism published across the disciplines of psychology, sociology, religious studies and political science between 2001 and 2012, of which only 42 were empirical (Brewster et al., 2014). A search of Google Scholar from 2015 through the end of 2019 using the search term 'psychology of atheism' produced 95 hits, but, of them, only 15 were empirical studies. For example, Bradley and colleagues investigated American atheists' justifications for their beliefs, finding that many justifications were nonintellectual. Some atheists reported bad personal experiences with religion, finding the idea that there is no God emotionally satisfying or believing that religions had a damaging impact on society (Bradley et al., 2018). The authors also found that a substantial subgroup of atheists had a clear conception of a relational God towards which they felt negative emotions, such as anger (Bradley et al., 2017).

In an investigation of the cognitive factors that may predispose one to atheism, Pennycook and colleagues (2016) reported a meta-analysis of 35 studies examining the relationship between religious beliefs and analytic thinking (usually defined in terms of the subjects' performance on some variant of Frederick's (2005) cognitive reflection task) and concluded that 'atheists and agnostics are more reflective than religious believers'. Other psychological constructs appear to have more complex relationships with atheistic beliefs. For example, a recent meta-analysis found a high heterogeneity in the literature on death

anxiety and religious belief, with some evidence of an inverted U relationship when religiosity was considered as existing on a continuum with atheism so that people very high or low on religious belief show low levels of anxiety (Jong et al., 2018). This finding has been interpreted as being consistent with studies showing that belief in supernatural agents is associated with low levels of death anxiety in people who identify as religious but with high levels of death anxiety in those who identify as atheist (Jong et al., 2013).

An important conceptual issue that has clouded interpretation of the limited studies in the field is the treatment of atheism as a category defined in opposition to religious belief. Indeed, in much of the relevant literature, atheism is described as 'nonbelief' or at least as being at the opposite end of a spectrum from religion, with agnosticism between the two extremes. This approach fails to recognise that atheism can be positive belief system as is evident in both the philosophical literature (e.g., Gray, 2018) and in the forceful arguments of atheism's modern advocates, such as Dawkins and Harris. This failure to acknowledge that both atheistic beliefs and religious beliefs may be held more or less strongly—so that, for example, it is possible to be neither religious nor an atheist or to hold some nuanced combination of the two types of belief—makes the interpretation of empirical studies of atheism problematic. For example, in Pennycook et al.'s (2016) meta-analysis, every study defined atheism either as a category in opposition to religion or in terms of low scores on a religiosity measure. It is therefore not possible to determine whether higher levels of analytic thinking are associated with the absence of religious belief or a positive set of atheistic beliefs or both, making the conclusion that 'atheists … are more reflective than religious believers' (Pennycook et al., 2016) uncertain or at least a possible oversimplification. Arguably, the same issue characterises studies that use nonreligious people as controls in the hope of understanding the role of psychological factors in

religiosity. For example, a sizeable body of research literature apparently supports the claim that religious belief is negatively associated with intelligence (Zuckerman et al., 2013) and/or that intelligence is positively associated with atheism (Lynn et al., 2009), but, in the absence of appropriate independent measures of religious and atheistic belief, it is impossible to tell which of these propositions is correct.

Purposes of the present studies

The present studies aimed to test the hypothesis that atheism is a positive belief system independent of religion and to develop a suitable questionnaire instrument (the Monotheist and Atheist Beliefs Scale [MABS]) that will be useful to researchers in the field. In two studies, we used exploratory and confirmatory factor analysis (CFA) to compare models in which atheistic and religious beliefs were considered as belonging to a single dimension as well as models in which they were considered independent but negatively correlated constructs, predicting that the latter would better fit the data. In the second study, we also studied independent associations between the two belief systems and analytic thinking and death anxiety to explore whether there are specific associations with each belief system and to contrast the findings with those obtained when treating belief as existing on a unidimensional religious belief–atheism scale.

4.3 Study 1

4.3.1 Method

In study 1, we piloted items for a scale designed to measure religious and atheistic beliefs and used exploratory factor analysis to identify the structure of the scale. We hypothesised that religious (monotheistic) beliefs and atheistic beliefs would form negatively correlated but separate factors.

Participants

The participants were recruited via a series of tweets from the senior author's Twitter account (20k+ followers) and were not intended to be representative of the UK population. They were told that the purpose of the survey was to pilot a questionnaire about religious and atheistic beliefs and were invited to follow a link to an online survey hosted by the survey company Qualtrics and to provide feedback via Twitter if they chose. Of the respondents, 206 were male and 282 female (total N = 488); their (M = 31.7 years, SD = 12.20; *min* = 20; *max* = 82), and 80.8% had received a university education. When asked about their religious identity ('Religious conviction: How would you classify your religious belief now?' with answers chosen from a drop-down menu), 90 (18.4%) identified as Christian, 4 (0.8%) as Muslim, 2 (0.4%) as Jewish, 6 (1.2%) as Buddhist, 32 (6.5%) as other religion, 87 (17.8%) as agnostic and 267 (54.5%) as atheist. Ethical approval was obtained from the University of Liverpool ethics committee.

Measures

Monotheist and Atheist Beliefs Scale

We focused on beliefs, defined as propositions about the world (Bentall, 2018). Hence, we excluded items that concerned practice (e.g., religious worship) or identity (e.g., the sense of belonging to a religion or to a society of atheists) or that had an explicit affective content. Twelve items reflecting religious beliefs were created, some by adapting items from the Duke University Religion Index (Koenig & Büssing, 2010) and Huber and Huber's (2012) Centrality of Religiosity Scale (see Table 4.1). These included, for example, 'God has revealed his plan to us in holy books' and 'Sometimes, it is possible for human beings to feel the presence of God'. Given the extraordinary variety of religious beliefs worldwide, it was not possible to sample beliefs relating to all religious belief systems, so all the items were designed with the monotheistic and, especially, Abrahamic religions in mind. Eight atheism items were constructed to match the monotheistic belief items in form, informed by the relevant literature on atheism, including Dawkins (2006), Harris (2004) and Gray (2018). The items covered a broad range of beliefs associated with atheism, including negative beliefs about religion (e.g., 'Praying to God is a waste of time' and 'Moral judgement should be based on respect for humanity rather than religious doctrine'), as well as those endorsing a nonreligious ontology (e.g., 'There is nothing in the universe that cannot be explained by scientific laws') and human progress (e.g., 'Despite wars and crises, history reveals that human progress is inevitable over the long term'). The full item set is shown in Table 4.2. The responses were on a 5-point scale: 1 = *strongly disagree*, 5 = *strongly agree*.

Table 4.1

Monotheism scale's adapted items and the original items from both the Duke University Religiosity Scale and Centrality of Religiosity Scale.

Scale	Original items	Monotheism adapted Items
The Duke University Religion Index	In my life, I experience the presence of the Divine (*i.e.*, God)	Sometimes it is possible for human beings to feel the presence of God.
	My religious beliefs are what really lie behind my whole approach to life	God is aware of everything we do.
Centrality of Religiosity Scale	How often do you pray?	God hears the prayers of human beings.
	How often do you experience situations in which you have the feeling that God or something divine intervenes in your life?	God or something divine sometimes interferes in the affairs of human beings.
	To what extend do you believe in an afterlife—e.g. immortality of the soul, resurrection of the dead or reincarnation?	There is an afterlife (immortality of the soul, resurrection of the dead or reincarnation).
	How often do you experience situations in which you have the feeling that God, deities, or something divine wants to communicate or to reveal something to you?	God sometimes reveals his will directly to human beings.
	In your opinion, how probable is it that a higher power really exists?	A higher power really exists.
	How often do you pray spontaneously when inspired by daily situations?	We can communicate directly to God by praying.

Analysis

Exploratory factor analysis was conducted on SPSS version 25 using oblimin rotation (because the religious belief and atheistic scales were expected to be negatively correlated). As recommended by Reise and colleagues (2000), we used maximum likelihood to extract the factors. The scale scores were compared across self-defined groups in terms of religious identity (religious, agnostic, atheist).

4.3.2 Results

Exploratory factor analysis

The factor extraction revealed two factors with eigenvalues of greater than 1 (the Kaiser criterion), with the first factor (eigenvalue = 11.01) accounting for 52.67% of the variance and the second factor (eigenvalue = 1.63) accounting for a further 4.61%. A third factor had an eigenvalue of exactly 1 but, after inspection of the scree plot, we selected a two-factor solution. Tabachnick and Fidell (2001) recommend reporting the pattern matrix when interpreting factors because it represents the unique contribution of the factors to the variance explained by the indicators, controlling for other factors in the model; this is shown in Table 4.2. Nearly all the items had high loadings on either the first factor (religious beliefs) or the second factor (atheistic beliefs). Many had lower negative loadings on the other factor although some of the atheism items are exceptions, notably items 4, 'The idea of God is a delusion', and 14, 'Praying to God is a waste of time'. One item, 11, 'Despite wars and crises, history reveals that human progress is inevitable over the long term' (chosen in the light of Gray's account of atheism and, on reflection, not explicitly endorsing either a religious or atheistic worldview) had low loadings on both factors. The factor scores were negatively correlated: r = - .50. When the religious belief and atheism scales were used to generate simple subscales, their α = .96 for religious beliefs (arguably suggesting some redundancy between the items) and α = .79 for atheistic beliefs, and the negative correlation between the two scales was r = -.69.

Table 4.2

Pattern matrix from study 1 for a two-factor solution of religiosity and atheism items (extraction method: maximum likelihood; rotation: oblimin).

	Factor loading	
	1	**2**
Factor 1: Religion (monotheism)		
1. The soul is immortal.	**.918**	.160
2. A higher power really exists.	**.951**	.095
5. God has revealed his plan to us in holy books.	**.675**	-.200
6. We can communicate directly to God by praying.	**.864**	-.113
7. Sometimes, it is possible for human beings to feel the presence of God.	**.538**	-.329
8. God or a divine power exists.	**.942**	.034
13. God or something divine sometimes interferes in the affairs of human beings.	**.763**	-.129
15. God sometimes reveals his will directly to human beings.	**.804**	-.140
16. There is an afterlife (immortality of the soul, resurrection of the dead or reincarnation).	**.945**	.136
18. God is aware of everything we do.	**.904**	-.018
19. God hears the prayers of human beings.	**.912**	-.043
20. Our fate in the life hereafter is determined by our deeds on Earth.	**.670**	.045
Factor 2: Atheism		
3. Religious beliefs will ultimately be replaced by scientific theories.	-.097	**.504**
4. The idea of God is a delusion.	-.408	**.395**
9. Belief in gods has been the source of great misery to humankind.	-.055	**.533**
10. Moral judgement should be based on respect for humanity rather than religious doctrine.	-.335	**.385**
11. Despite wars and crises, history reveals that human progress is inevitable over the long term.	.075	**.266**
12. There is nothing in the universe that cannot be explained by scientific laws.	-.314	**.373**
14. Praying to God is a waste of time.	-.456	**.426**
17. It is wrong to indoctrinate children into a religion.	-.190	**.496**

Comparisons by religious identity

To validate the scores, we used one-way ANCOVA with religious identity (religious, agnostic, atheist; non-monotheistic religious identity and 'other religious conviction' excluded) and sex as fixed factors and age as a covariate. There was a significant difference for religious belief (F[2,442] = 534.71, p < .001, η_p^2 = .71). Planned contrasts revealed that all three groups differed significantly from one another (p < .001 for each contrast), with the scores for agnostics falling between those of monotheists and atheists. There was no effect for age but a marginal affect for sex (F[1,442] = 3.87, p < .05, η_p^2 = .009), with females scoring slightly higher than males. For atheism, a main effect for religious identity was also found (F[2,442] = 136.05, p < .001, η_p^2 = .738), and agnostics again fell between monotheists and atheists (both contrasts p < .001), but there was no effect for age or sex.

4.3.3 Study 1 Discussion

As expected, two factors emerged. Also as expected, these were negatively correlated, which was perhaps inevitable given that some of the atheism items expressed hostility to religious ideas (e.g., 'It is wrong to indoctrinate children into a religion'). The total scores clearly discriminated between self-identified monotheists, agnostics and atheists, with agnostics falling midway between monotheists and atheists. On the whole, the items loaded strongly on one factor although the atheism items also tended to load negatively on the religious factor, which is perhaps not surprising given that a negative attitude towards religion is an important element of atheism. One item (11) loaded poorly on both factors: 'Despite wars and crises, history reveals that human progress is inevitable

over the long term'. This item was included in light of Gray's (2018) account of humanist varieties of atheism, but in retrospect, given its lack of explicit religious or atheistic content, its poor performance is not surprising.

Given these promising but not conclusive findings, and this was a pilot investigation, and the sample was clearly not representative of the UK population, especially in terms of education and religious identity (in the 2011 census of England and Wales, 59% of the population identified as Christian, 5.0% as Muslim and 24.0% as having no religion [Office for National Statistics, 2013]). it was decided to assess a slightly modified version of the MABS on a sample that was much more representative of the UK population. We also explored associations between religious and atheistic beliefs and two psychological constructs previously associated with them in studies in which atheism was treated as the absence of religious belief: death anxiety and analytic thinking. To explore the implications of relinquishing this assumption, we carried out analyses in which the two belief systems were treated as separate but negatively correlated as well as analyses in which we scored the participants on a unidimensional religious versus atheistic beliefs scale.

4.4 Study 2

4.4.1 Method

Participants

The participants were recruited by Qualtrics and were stratified by sex, age and household income to be approximately representative of the UK population. A total of 722 UK residents attempted the survey, but the final sample was 638 after the removal of incomplete surveys and those completed implausibly quickly (pre-defined following pilot work by the survey company as < 15 minutes). Two hundred and ninety-six participants (46.4%) were male, with (*M* = 46.60 years, *SD* = 15.83), and 342 (53.6%) were female, with

(*M* = 43.77 years, *SD* = 16.16). Five hundred and fifty-four (86.8%) identified as white British, with the rest belonging to a range of ethnic minority groups, and 245 (38.4%) had received a university education. Responses to the question about self-reported religious identity (using the same method as in study 1) yielded 325 (50.9%) Christian, 16 (2.5%) Muslim, 10 (1.6%) Jewish, 8 (1.3%) Hindu, 5 (0.8%) Buddhist, 4 (0.6%) Sikh, 46 (7.2%) other religions, 69 (10.8%) agnostic and 155 (24.3%) atheist. This represents a percentage of Christians lower than that recorded in the 2011 census (Office of National Statistics, 2013) although not dramatically so, probably because the question was asked differently in this survey than in the census. Ethical approval was obtained from the university ethics committee.

Measures

Monotheism and Atheism Beliefs Scale

An 18-item scale was derived from the scale used in study 1 by excluding two items: 'God or a divine power exists' (because it repeated another item (A higher power really exists.)) and 'Despite wars and crises, history reveals that human progress is inevitable over the long term' (because the factor loadings in study 1 were small on both factors). Responses were made on a 5-point scale: 1 = *strongly disagree*, 5 = *strongly agree*. The alpha coefficient was .96 for the monotheism subscale and .83 for atheism.

The Death Anxiety Inventory

The Death Anxiety Inventory (Tomás-Sábado et al., 2005) is a 17-item scale with four subscales (Externally Generated Death Anxiety, Death Acceptance, Death Finality and Thoughts about Death). Responses are rated on 5-point scales ('*totally disagree*' to '*totally agree*'). The alpha coefficient for the total scale was .95, and the subscales' alphas were .80

for Externally Generated Death Anxiety, .88 for Death Acceptance, .89 for Death Finality and .83 for Thoughts about Death. Given the high intercorrelations between the subscales (r = .67 – .89), we used the total scale score.

The Cognitive Reflection Test

The three-item CRT (Fredrick, 2005) was designed to assess the ability to reflect before answering questions designed to hint at a wrong answer (i.e., "A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?" and "If you're running a race and you pass the person in second place, what place are you in?"). We expanded the scale to include an additional four items from Toplak and colleagues (2014) and three from Thompson and Oppenheimer (2016), presented in a four-option multiple choice format as recommended by Sirota and Juanchich (2018). The items were presented in random order, and 45 seconds were allowed for each answer, after which the questionnaire automatically moved to the next item. The alpha coefficient for the 597 participants who completed all 10 items was (α =.70). Forty-one participants failed to complete all the test items.

Analysis plan

First, CFAs were conducted to compare two models: (1) a model in which all religiosity and atheism items loaded on a single religiosity/atheism factor and (2) a model in which religiosity and atheism were separate but correlated latent variables. Confirmatory factor models were conducted in Mplus 7.0 (Muthen & Muthen, 2013) with robust maximum likelihood estimation (MLR) (Yuan & Bentler, 2000). The following recommendations (Hu & Bentler, 1998, 1999) were followed to assess model fit: nonsignificant chi square (χ^2), comparative fit index (CFI) (Bentler, 1990) and Tucker Lewis

Index (TLI) (Tucker & Lewis, 1973) values above .95 reflected an excellent fit while values for those two indices above .90 reflected an acceptable fit; a root mean square error of approximation (RMSEA) (Steiger, 1990) with 90% confidence intervals having values of .06 or less reflected an excellent fit while values of less than .08 reflected an acceptable fit. The standardised root mean square residual (SRMR) (Chen, 2007) was also used, with values of .06 or less indicating an excellent fit and values of less than .08 indicating an acceptable fit. The Bayesian information criterion (BIC) (Schwarz, 1978) was used to evaluate and compare the models, with the smallest value indicating the best fitting model. In relation to the BIC, Raftery (1996) suggests that a 2–6 point difference offers evidence of model superiority, a 6–10 point difference indicates strong evidence of model superiority and a difference of greater than 10 points indicates very strong evidence of model superiority. Second, we calculated the total scores for both the religious belief and atheistic belief items as well as for a unidimensional scale in which atheism was assumed to be the opposite of religion; the latter scale was constructed by reverse-scoring the atheism items. We then used regression to fit the linear and quadratic relationships between the three scales—religious belief, atheistic belief and the unidimensional scale—and the two psychological constructs of interest (analytic thinking and death anxiety). In previous studies in which religious and atheistic beliefs were considered in a unidimensional framework, atheism has been associated with high scores on analytic thinking (Pennycook et al., 2016), and a curvilinear relationship has been reported between religiosity and death anxiety (Jong et al., 2018). In six analyses comparing the two models for each type of belief measure (independent variable: unidimensional, religious belief or atheistic belief) and each type of psychological construct (dependent variable: death anxiety or analytic thinking), we considered the proportion of variance accounted for as well as the BIC interpreted as in our CFA. As linear

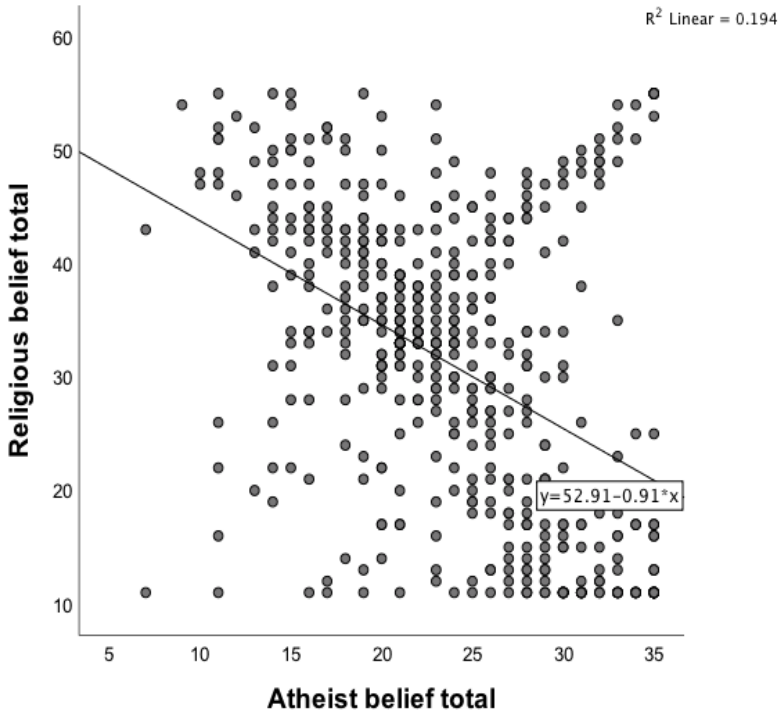
models are more parsimonious than quadratic models, we assumed that they were preferable unless there was strong evidence of a better fit for the quadratic model. Finally, we used analysis of covariance to examine the relationship between religious identity (defined as in study 1) and our religious belief and atheistic belief scales as well as with analytic thinking and death anxiety.

4.4.2 Results

Several features are worth noting in the scattergram showing the relationship between religious belief scores and atheistic belief scores (Figure 4.1). First, the majority of the participants fell in a band ranging from high religious belief to high atheistic belief, marked by the regression line. Second, very few participants had low scores on both scales. Third, there seems to be a group of individuals who defy the negative association between the two belief systems and score highly on both.

Figure 4.1

Scattergram showing the relationship between religious belief and atheistic belief scores in study 2.



Confirmatory factor analysis

The model fit indices for the CFA models show that the two-factor model provided an acceptable fit while the fit statistics for the one-factor model indicated a poor fit (Table 4.3). The two-factor model's lower BIC compared to the one-factor model also provides strong evidence of the superiority of the former. The standardised factor loadings for the religiosity and atheism latent variables were all positive and statistically significant, ranging from .545 to .941, and the correlation between the latent variables was -.459, $p < .001$. The composite reliability (CR) (Raykov, 1997) was high for religiosity (*CR* = .96) and atheism (*CR* = .83).

Table 4.3

Religiosity and Atheism fit indices for a one-factor model and for correlated a two-factor model, Study 2.

Model	$x^2(df)p$	RMSEA	CFI	TLI	SRMR	BIC
1 FACTOR MODEL	1187.415 (135) < .001	.111	.812	.787	.105	31132.337
2 FACTOR MODEL	612.696 (134) < .001	.072	.915	.903	.062	30286.859

Linear and quadratic associations between belief scales and psychological constructs

Although our CFA clearly supported the superiority of a two-scale model (religious and atheistic belief) over a single, unidimensional model, a unidimensional scale based on totalling the item scores had an acceptable reliability (α = .94). This was to be expected given the correlation between the scales (r = - .46, p < .001) and considering that alpha scores tend to increase with increased scale length (Streiner, 2003).

Table 4.4

Regression models for linear and quadratic relationships between predictor measures of belief (unidimensional religious belief scale, religious belief scale and atheist belief scale) and death anxiety and analytic thinking (CRT scores), from Study 2. Lower BIC scores indicate better model fit, and a BIC difference of 10 is interpreted as strong evidence of model superiority (Raftery, 1996).

	B linear (se)	B quad (se)	R-squared	BIC
	Analytic thinking (CRT scores)			
Unidimensional religious belief scale				
Linear	-0.042 (.006)**		.082**	2686.963
Linear and quadratic	-0.036 (.006)**	0.001 (.000)**	.112**	2674.096
Religious beliefs (total)				
Linear	-0.057 (.008) **		.091**	2681.690
Linear and quadratic	-0.054 (.007)**	0.002 (.001)**	.110**	2675.474
Atheist Belief (total)				
Linear	0.058 (.016)**		.022	2725.337
Linear and quadratic	0.058 (.016)**	0.003 (.002)	.025	2729.676
	Death Anxiety			
Unidimensional religious belief scale				
Linear	0.337 (.039)**		.118**	5268.982
Linear and quadratic	0.273 (.037)**	-0.014 (.002)**	.188**	5222.423
Religious beliefs (total)				
Linear	0.540 (.050)**		.181**	5221.670
Linear and quadratic	0.529 (.052)**	-0.008 (.004)	.187**	5223.393
Atheist Belief (total)				
Linear	-0.103 (.122)		.002	5347.917
Linear and quadratic	-0.102 (.121)	-0.040 (.017)*	.014	5346.485

* p < .05, ** p < .01

Table 4.4 shows the associations between the three types of scale score (religious belief, atheistic belief and the unidimensional scale) and death anxiety and analytic thinking (CRT). When the CRT was regressed on the unidimensional scale, the BIC offered strong evidence of the superiority of the quadratic model and a corresponding increase in the amount of variance accounted for. There was only weak evidence of the superiority of the

quadratic model when the CRT scores were regressed on religious beliefs, however, and, in the case of atheistic beliefs, the linear model had a superior BIC score, but neither model predicted a significant amount of the variance in analytic reasoning. Hence, it is reasonable to conclude that the relationship between unidimensional religiosity and analytic reasoning is curvilinear, but, when the two belief systems are considered separately, there is a significant, negative and linear association with religious belief but no association with atheistic belief. When death anxiety was regressed on the unidimensional belief scale, the BIC difference and the increase in variance that was accounted for offered strong evidence that the quadratic model was superior. When the two belief systems were considered separately, however, a different picture emerged. In the case of religious belief, the quadratic model was not superior to the linear model, and there was a positive association with death anxiety, but, in the case of atheistic beliefs, neither model accounted for a significant amount of the variance.

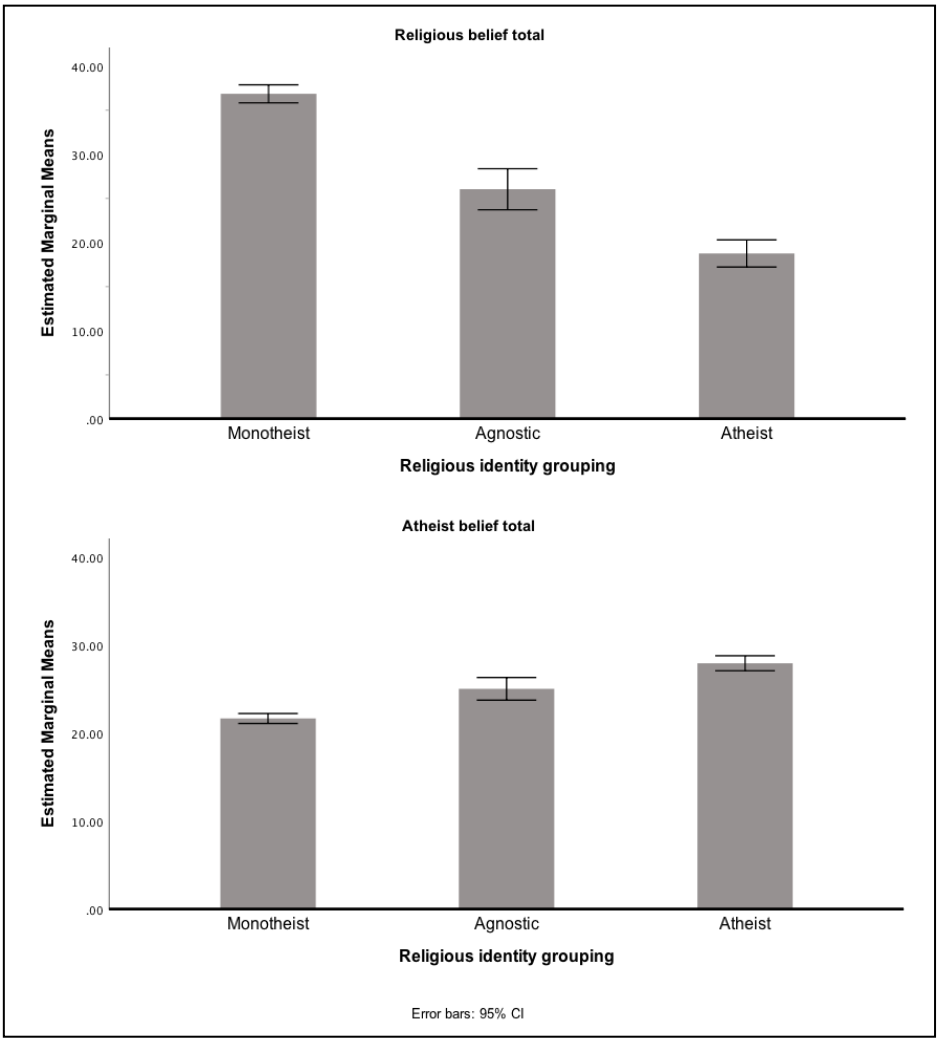
Comparisons by religious identity

Religious identity was defined as in study 1, and the total scores for the three identity groups are shown in Figure 4.2. Three-factor ANCOVA on the religious belief scores (religious identity, sex and university educated vs. not) with age as a covariate revealed a main effect for religious identity (F[2,561] = 195.73, p < .001, η_p^2 = .41). All three groups differed significantly from one another (p < .001 for each comparison) (Figure 4.2). The effect for graduate status was not significant, but there was a significant effect for age (F[1,561] = 25.65, p < .001, η_p^2 = .04), reflecting the tendency of older people to be less religious. There was no significant effect for sex.

A similar analysis of the atheistic belief scores revealed a significant main effect for religious identity (F[2.561] = 71.66. p < .001, η_p^2 = .20), with all three groups differing significantly from one another (p < .001) (also see Figure 2). There were also main effects for sex (F[1,561] = 10.79, p < .001, η_p^2 = .02), which accounted for higher mean scores in males than females, and for university education (F[1,561] = 5.70, p < .02, η_p^2 = .01), which accounted for higher scores among graduates, but there was no association between atheistic beliefs and age.

Figure 4.2

Religious and atheist belief scores by religious identity group (Study 2)



4.5 General Discussion

This paper examines the utility of considering religious and atheistic beliefs as separate, albeit negatively correlated belief systems and introduces a new questionnaire measure that discriminates between the two, which may be useful to researchers. Some of the findings, particularly those in which the scores on the two measures were compared according to religious identity, may be considered to support a unidimensional account, with agnostics scoring midway on both scales. These differences support the validity of our measure, but, interestingly, inspecting the scattergram from study 2 (Figure 4.1) reveals a more nuanced picture. The absence of people with low religious and atheistic beliefs—those who, in the literature, have been referred to as 'apathists' (Rauch, 2003)—is striking. Of equal interest, substantial numbers scored highly on *both* religious and atheistic beliefs, a possibility that would not have been revealed by the use of a simple, unidimensional scale. It is possible that some of these responses were the consequence of inattentive responding; future studies might include attention checks to eliminate this possibility. In future research, these individuals merit special investigation. If, as some researchers have argued, atheism arises from the suppression of a natural human tendency to attribute intentionality to events (Norenzayan & Gervais, 2013), then it is possible that these individuals are particularly taxed by the struggle, which may have implications for their psychological health. Alternatively, it is possible that they possess the considerable intellectual complexity required to accommodate both belief systems.

The data on death anxiety also point to the usefulness of treating religious and atheistic beliefs separately. A unidimensional measure revealed a curvilinear relationship, with low death anxiety in highly religious and highly atheistic individuals as reported in

previous studies (Jong et al., 2018), but the analyses in which the two belief systems were treated separately suggest that this may be a misleading picture created by the superposition of both belief systems in a single scale. When treated separately, death anxiety was positively and linearly associated with religious belief, but there was no association with atheistic beliefs.

The positive association with religious belief is not hard to understand and is supported by studies finding that priming death anxiety increases the strength of religious belief in those who are already religious (Willer, 2009), but the lack of association with atheism observed in this study merits consideration in further research. The literature on terror management theory suggests that anxiety about death leads to system justification, that is, a stronger belief in whatever system of understanding seems to give meaning to the self and the world (Solomon et al., 2015). Hence, it might be expected that, despite the lack of association seen in this study, provoking anxiety about death will lead to increased atheism in those who, for other reasons, are inclined to atheistic beliefs. At least one study has shown this effect, although only for explicit atheistic beliefs, whereas, for implicit beliefs (measured as associations between supernatural concepts and the concepts *real* or *imaginary*), all the participants showed more evidence of belief in supernatural entities (Jong et al., 2012). The relationship between analytic thinking and belief again points to the utility of considering the two belief systems separately. When considered independently, religious belief was negatively associated with analytic thinking as reported in previous studies (Pennycook et al., 2016). However, when the belief systems are considered separately, religious belief is again negatively associated with analytic thinking whereas atheistic beliefs bear no relationship at all with analytic thinking. Together with the previous findings on death anxiety mentioned earlier, these findings seem consistent with a model in

which active suppression is required to relinquish religious belief (Norenzayan & Gervais, 2013) but separate factors (perhaps cultural or intellectual) are required to develop an active atheistic belief system.

Some limitations of these studies are important. Study 1 was highly unrepresentative of the UK general population although study 2 was not. Given the importance of cultural factors in the development of belief systems, generalisation to other places and nations cannot be assured, and it would be useful to replicate these studies in a cross-cultural context. Our religiosity scale is focused on monotheistic belief systems, so it is possible that our findings will not generalise to, for example, Hindu societies. Nonetheless, it will be important in future studies to evaluate our scales in societies in which Christian beliefs and practices are more prevalent than in the UK (e.g., the United States, the Republic of Ireland, or Poland) and to establish whether the same factor structure can be replicated in predominantly Muslim countries. Finally, as already noted, the studies were cross sectional; therefore, causal relationships between death anxiety and analytic thinking and religious and atheistic beliefs cannot be assumed on the basis of these data alone. A major strength of the research is that it has yielded useful measures that can be employed in future studies of religious and atheistic beliefs, and we hope that other researchers will feel free to employ them.

Chapter 5: Strong Beliefs: A Bifactor Model

5.1 Abstract

Many types of beliefs are held tenaciously, often with great emotional investment, and are resistant to counter-argument. These *master explanatory systems* include paranoid belief systems, belief in conspiracy theories, religious beliefs, political ideologies, and paranormal beliefs. Here we explore the relationships between these belief systems and whether associations between them could be explained by a common latent strong belief factor, S, which we hypothesize is influenced by death anxiety and poor analytic reasoning. Two online studies collected data on paranoid, conspiracy, religious, political and paranormal beliefs in representative samples of the UK population (*N1* = 1508, *N2* = 638). We compared bifactor models which included the common latent trait with confirmatory factor analysis models in which each type of belief was represented by a single factor. In the first survey, the bifactor model of paranoia, conspiracy theories, religiosity, and paranormal beliefs but not including political ideologies was superior to the equivalent confirmatory factor analysis model. In the second survey, atheism was added to the belief systems and political ideologies scale was replaced by nationalism and patriotism scales. The bifactor model was superior to the equivalent CFA model but, as we had hypothesized, best fit was achieved when nationalism but not patriotism nor atheism were included in the model. In both studies, bivariate regression and multivariate regression models were used to test the relation between the common latent factor S and the specific belief factors and age, sex, analytical reasoning (Cognitive Reflection Test, [CRT]), and death anxiety. S was associated negatively with age, female sex, and analytical reasoning, but positively associated with

death anxiety. The research provided promising evidence of a common strong beliefs factor and its relationship with other psychological constructs were consistent across the two surveys. Further studies should aim to replicate these findings and may be informative about other strong belief systems such as delusions.

5.2 Introduction

In July 1984, Ron and Dan Lafferty visited the home of their brother Alan in the town of American Fork, Utah. Alan was away working at the time, but they were greeted by his wife Brenda who was taking care of her 15 month-old daughter Erica. Soon after their arrival, the two men stabbed to death both Brenda and Erica (Krakauer, 2003). Arrested after a half-hearted attempt to evade law enforcement agencies, the Laffertys, who belonged to a large family of Mormon fundamentalists, claimed that the murders had been carried out on the instruction of Jesus Christ; Dan, later asserted that he was the prophet Elijah. At trial, their crime presented a conundrum for mental health professionals who were unable to agree on whether the brothers were suffering from a shared psychotic illness or were in the grip of an extreme religious ideology. A similar dilemma faced psychologists and psychiatrists at the trial of the Norwegian mass-murder Anders Behring Breivik (Melle, 2013) who, in July 2011, bombed Norwegian government offices in Oslo, killing eight, before shooting to death sixty-nine young political activists attending a summer camp on the nearby island of Utøya. Breivick justified his actions on the grounds that he was a member of a secret organization of Knights Templar fighting feminism, the 'Islamification' of his country and the "cultural suicide of Europe". Forensic problems such as these raise fundamental questions about where normal belief ends and pathological belief begins.

Pathological and nonpathological beliefs

It would require very considerable time and effort to capture the full range of ways in which 'belief' and related concepts are employed in the social sciences. For example, the term is sometimes used to denote phenomena to be explained (for example, in the anthropology of religion (Mair, 2013) and certain kinds of historical analyses; e.g. (Whitehouse et al., 2019)) and at other times as an explanatory variable (for example, in cognitive models of psychopathology, e.g. (Beck, 1976) or theories of decision making and behaviour change, e.g. (Ajzen, 1991)). Nonetheless, what is involved in holding a belief has rarely been analysed from a psychological perspective. Here, we build on the approach of contemporary analytical philosophers of mind who assume that "'belief' to refer to the attitude we have, roughly, whenever we take something to be the case or regard it as true" (Schwitzgebel, 2015). Although the extent to which nonhuman animals can be said to have beliefs can be debated, we further make the assumption that beliefs are propositional (Bentall, 2018). Hence, to believe something is to make propositions about the world and hold that these propositions are true.

In the psychiatric literature, pathological beliefs are known as *delusions*, which are defined in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) as "Fixed beliefs that are not amenable to change in light of conflicting evidence" (p. 87). Typically, these beliefs follow themes that reflect common concerns about the individual's position in the social universe, such as, persecution (paranoid delusions, the most common), reference (that certain gestures, comments, and environmental cues are directed at the self), and grandiosity. It has been argued that defining what distinguishes delusions from other kinds of beliefs might be considered a psychological 'Hilbert' problem that has implications not

just for psychiatry but also for our understanding human belief systems in general (Ross & Mckay, 2017).

Within psychiatry, delusions have typically been assumed to be qualitatively distinct from ordinary beliefs, and indeed, some have argued that they are "empty speech acts, whose informational content refers to neither world or self" (Berrios, 1991) and hence may not actually be beliefs at all (for a discussion see (Bortolotti, 2018)). These ideas have their origins in an influential analysis by the philosopher-psychiatrist Karl (Jaspers, 1913/1963) who argued that true delusions are *ununderstandable* in the sense of being impenetrable by empathy and inexplicable in terms of an individual's personality and life history (see (Bentall, 2018) for a critique of this and other phenomenological criteria).

This assumption is challenged by epidemiological evidence, which shows that apparently delusional beliefs are much more common than psychiatric admission statistics would imply. For example, in a sample of more than 7000 Dutch people, 3.3% were found to have 'true' delusions and 8.7% had delusions that were not clinically relevant (that is, which were not associated with distress) (van Os et al., 2000) and in a large sample of primary care patients in Southwest France, 69.3% of those without a history of psychiatric disorder reported that people were not who they appeared to be, 42.2% reported that seemingly innocuous events had double meanings and 25.5% reported that they were being persecuted (Verdoux et al., 1998). Consistent with these observations, taxometric and other kinds of statistical research on paranoid delusions (the one type that has been subjected to extensive psychological study (Bentall et al., 2001; Freeman, 2016; Murphy et al., 2018) has shown that extreme clinical variants of this kind of belief exist on a continuum with ordinary and more prevalent kinds of suspiciousness (Bebbington et al., 2013; Elahi et al., 2017). However, a few claims there is a lack of scientific evidence on the continuum of psychosis,

and it needs further investigations (David, 2010; Lawrie et al., 2010). The demonstrated role of life events in paranoid beliefs also raises questions about their ununderstandability; in both clinical and nonclinical populations they are associated with disrupted early attachment relationships and lifetime experiences of victimisation (Mirowsky & Ross, 1983; Janssen et al., 2003; Bentall et al., 2012; Wickham, & Bentall, 2016; Wickham et al., 2015).

Master explanatory systems

Rather than searching for differences between pathological and nonpathological beliefs, we think it may be fruitful to consider whether there are any common factors involved in all kinds of belief that are emotionally-charged, held with strong conviction and that are resistant to change. Such beliefs include religious and political ideologies, and we think it no accident that it was precisely these kinds of beliefs that created difficulties for the mental health professionals examining the Lafferty brothers and Anders Brevick. In what follows we will also consider conspiracy theories and beliefs about paranormal phenomena. We suggest that each of these can be described as a master explanatory system (MES) because they consist not of isolated propositions but of organised sets of interlinked propositions which individuals use when interpreting events in their world (Bentall, 2018). It is important to note that many of these types of MES involve elements other than propositions; for example, religious and political ideologies typically involve social activities and are sources of social identity, which is why anthropologists in particular have often interpreted them in terms of a form of non-literal, ethical or social commitment (Mair, 2013). However, it is the propositional elements that we are concerned with here. These beliefs, like delusions, tend to be held tenaciously, and may provoke emotion and reactance if challenged.

Also, like delusions, MES tend to be thematically constrained and have discernible structures, possibly reflecting particular psychological dispositions or 'mentalities'. For example, a right-left dimension of ideology contrasting preference for conserving existing institutions versus those support for radical change appears to be universal (Jost et al., 2009) and predates modern political systems (Hibbing et al., 2014), although some researchers have argued that variation in political belief is best captured by two dimensions of right-wing authoritarianism and social dominance orientation (Duckitt, & Sibley, 2010). In the case of religious belief, proposed structures depend on whether analyses are restricted to monotheistic religions and whether identity, religious social practices are included. For example, using international survey data from Christian countries (Lemos et al., 2019) identify four highly correlated factors but only two pertain to belief as defined here (belief in God and supernatural beliefs, especially belief in afterlife) whereas the widely used Duke university religion index represents intrinsic religiosity as a single factor (Koenig, & Büssing, 2010). Factor analytic studies suggest that belief in the paranormal represents a coherent set of dispositions, with some evidence of a single dimension running sometimes referred to as 'sheep'(believers) vs 'goats' (unbelievers) with beliefs about the paranormal representing a lower level than belief in one's own paranormal abilities (Lange, & Thalbourne, 2002; Drinkwater et al., 2018); even when an alternative multidimensional structure of paranormal beliefs have been proposed (Tobacyk, 2004), responses are dominated by a single dimension (Drinkwater et al., 2017). Similarly, a coherent unidimensional account of belief in conspiracies has been proposed, so that someone who believes in one type of conspiracy is likely to believe in others (Brotherton et al., 2013; Bruder et al., 2013). Importantly, these structures suggest that the individual propositions within a belief system are not necessarily bound together by logical connections. For example, there is no logical

reason why support for free market economics by conservatives should be associated with support for high levels of military spending or family values, or why belief in God entails belief in an afterlife, or why someone who believes in one particular type of conspiracy theory should be more likely to believe in others (indeed, sometimes to the point of holding conspiracy theories that are logically contradictory (Wood et al., 2012)).

A bifactor approach to identifying common factors in MES and paranoia

How can we test whether common factors play a role across all these apparently different belief systems? One approach is to examine correlations between them and, indeed, modest to positive associations have often been reported between most of these belief systems, for example between paranoia and belief in conspiracy theories (Imhoff & Lamberty, 2018), belief in the paranormal e.g. (Darwin et al., 2011) and social dominance orientation e.g. (Wilson & Rose, 2014). Although the literature on the relationship between abnormal belief and religiosity has largely been clinically focused, delusionality (Peters et al., 1999) and paranoia (Ayeni et al., 2011) have also been observed to be positively associated with religiosity.

Belief in conspiracy theories has been reported to be positively correlated with religiosity e.g. (Newheiser et al., 2011; Mancosu et al., 2017), belief in the paranormal e.g. (Darwin et al., 2011; Newheiser et al., 2011; Swami et al., 2011), conservativism (Galliford & Furnham, 2017) and right-wing authoritarianism (e.g., (Bruder et al., 2013). Not surprisingly, numerous studies have reported that belief in the supernatural correlates with religiosity e.g. (Thalbourne, 1995; Lindeman & Svedholm-Häkkinen, 2016) although there have also been some negative results e.g. (Svensen et al., 1992). Evidence of an association between

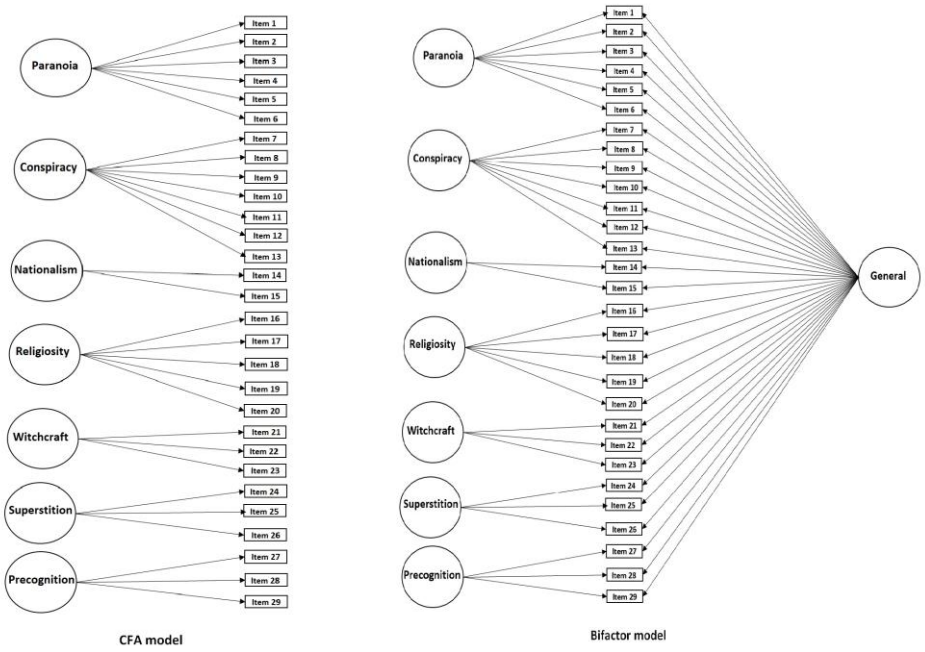
supernatural beliefs and political ideology is mixed in the limited available literature, e.g. (Heard et al., 1999). Finally, positive associations have been reported between religiosity and both conservativism and authoritarianism (Schlenker et al., 2012).

Promising though this evidence is, the diversity in the measures employed and some overlap between some of them (it should be no surprise that religious people are more likely to believe in religious conspiracy theories; (Newheiser et al., 2011) limits what can be deduced from these studies. Bifactor models provide a more promising framework for identifying common processes across different MES. In these models, covariations between different specific or 'group' factors (in this case belief systems) are explained by one general factor common to all (see Figure 5.1 for a conceptual diagram comparing a CFA model of seven belief systems – those actually investigated in our Study 2 – to a bifactor model). The general factor and specific factors are assumed to be orthogonal, so that each indicator (response on the items of a belief questionnaire) is caused by both the factor specific to that questionnaire and also the general factor. Importantly, goodness of fitness statistics can be used to compare a bifactor model with simpler confirmatory factor analysis models in which there is no general factor. As conventional goodness of fit statistics will always favour bifactor solutions, novel statistical methods have been proposed to determine whether a bifactor model is superior to a conventional factor model (Dueber, 2017; Rodriguez et al., 2016) and it has also been argued that the validity of bifactor solutions must be demonstrated by showing that the general factor is specifically associated with theoretically important constructs (Greene et al., 2019).

The first question that we address in this research, then, is whether a model which includes a general strong belief factor, which we henceforth refer to as 'S' (for 'strong' belief), is superior to models that treat each type of belief system as independent.

Figure 5.1.

A conceptual diagram of CFA model of seven belief systems (Left) to a bifactor model (Right)



The causes of S

If we find S, the implication is that one or more hidden processes play a role in determining a strong belief in all the MES we are considering. What could these processes be? Theoretical accounts of delusional beliefs generally point to two different kinds of processes: emotion-related processes that drive the belief system and cognitive impairments that prevent the belief system from being reasoned away (Coltheart, 2007; Bentall et al., 2009) and we see no reason to assume that MES are different.

One emotion-related process that has been implicated in a wide range of belief systems is death anxiety (DA). It is perhaps unsurprising that DA is associated with religiosity, although the relationship may be complex and nonlinear (Jong et al., 2018), possibly accounted for by religion soothing DA in strong believers (Jong et al., 2013). DA has

also been reported to be associated with paranormal and superstitious belief in some studies (Tobacyk, 2007; Wong, 2012) but not in others (Houran, 1997). It has also been associated with conservative beliefs (Jost et al., 2004), and severity of mental illness (Menzies et al., 2019) although we are aware of no study which specifically considered paranoid beliefs. These findings are supported by a substantial body of evidence that priming fear of death (mortality salience) provokes an increase in the strength with which existing belief systems are held (Solomon et al., 2015), although some concerns have been raised about the replicability of this effect (Klein et al., 2020). There is also debate about whether mortality salience leads to a shift towards more conservative and religious beliefs or whether it instead enhances belief in whatever belief systems are already held (and so makes atheists more atheist and liberals more liberal), with studies providing some evidence for both effects (Burke et al., 2013; Jong et al., 2012). On the basis of these findings, we therefore tentatively predict that death anxiety will be associated with 'S', a general tendency to strong belief and, furthermore, that a mortality salience intervention will increase the strength of 'S'.

A second process that has been implicated in the willingness to hold a wide range of beliefs has emerged from dual process models of cognition. Although these theories differ in detail (Evans, 2008) it is now widely accepted that human reasoning processes fall into two main types: type 1 (fast, intuitive and associative) versus type 2 (slow, analytic, reflective and propositional) (Kahneman, 2012), and it seems plausible that acceptance of emotionally-significant belief systems will be facilitated by 'cognitive miserliness', that is to say when individuals fail to use slow thinking to appraise propositions about the world. (Frederick, 2005)'s cognitive reflection task (CRT) has been the most widely used measure of 'miserly' cognition in which type 1 thinking is not regulated by more effortful type-2

analytical thinking (Toplak, 2014). (Bronstein et al., 2019) reported a modest association between poor performance on the CRT and subclinical paranoia, and a similar association has been reported for conspiracy theories by (van Prooijen, 2017). Poor CRT performance has also been found to supernatural beliefs and religiosity (Pennycook et al., 2016) and social conservativism in some (Deppe et al., 2015) but not all studies (Yilmaz & Saribay, 2017). We therefore tentatively hypothesise that 'S' will be predicted by CRT performance.

Summary of hypotheses

In this study we report two studies to test hypotheses derived from the above review of the literature on strongly held belief systems. In both, we assessed paranoia, belief in conspiracy theories, religious belief, belief in the paranormal and political beliefs and compared the goodness of fit of confirmatory factor models which treat these belief systems as separate phenomena with bifactor models in which a general 'S' factor explaining the correlations between the five belief systems is also included, hypothesizing that the bifactor models will be better fit. We also tested the validity of the bifactor model by assessing whether the general factor was associated with two variables which we predicted, on theoretical grounds, would be associated with 'S': death anxiety and analytical reasoning.

5.3 Study 1

5.3.1 Methods

Participants

Participants were recruited to be a close to representative national sample by the survey company Qualtrics, and were stratified by age (minimum age 18 years; approximately equal numbers from age bands 18-24; 25-34; 35-44; 45-49; 50-64; 65+), sex and household income (approximately equal numbers from quintiles defined on the basis of Office for National Statistics data (https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyearending2016): £0-599; £600-1,155; £1,156-2,247; £2,248-£3,604; £3,605-£7.061; £7,062 and above). 1,852 UK residents attempted the survey but, after removal of incomplete surveys or surveys completed implausibly quickly (pre-defined following pilot work by the survey company as < 12 minutes) the final sample was 1,508. An initial analysis of data from the survey in which we examined the relationship between paranoia and conspiracy theories, showing that they were correlated by separate phenomena, has been reported elsewhere (Alsuhibani, Shevlin, Freeman, Sheaves, and Bentall, in submission).

Of these, 742 (49.2%) were male with a mean age of 50.57 years (*SD* = 18.12) and 766 (50.8%) were female with a mean age of 45.04 years (*SD* = 15.64). 1440 (95.5%) were British nationals and 68 had other nationality. An indication of the representativeness of the sample can be judged from responses to questions about voting behaviour. For the UK general election of 2017, 32.7% reported voting Conservative, 32.5% voted Labour, 18% voted for other parties and 16.8% did not vote (actual figures: 29.0%, 27.6%, 12.4% and

31.0% respectively). For the 2016 referendum on Britain's membership of the European Union, 42.31% voted remain, 44.03% voted to leave and 13.66% did not (37.1%, 37.5% and 25.4%).

Measures

The revised Paranoia and Deservedness Scale (PaDS –R) was designed on the basis of psychometric analyses of the original scale (Melo et al., 2009) in a large sample of healthy individuals and patients with psychosis (Elahi et al., 2017) and other recent findings indicating that paranoia consists of four elements: interpersonal sensitivity, mistrust, fear of persecution and ideas of reference (Bebbington et al., 2013). The revised scale consists of 8 paranoia items (the P scale), two each from these domains (e.g. "My friends often tell me to relax and stop worrying about being deceived or harmed", "You should only trust yourself", "I believe that some people want to hurt me deliberately", and "Sometimes I think there are hidden insults in things that other people say or do") and two further items measuring beliefs about whether persecution is deserved, which are not used in this study. Items are answered on a 5-point scale ranging from "*Strongly agree*" to "*Strongly disagree*". In this sample, the eight-item P scale had an alpha coefficient of .91.

Generic Conspiracy Beliefs Scale (GCBS; (Brotherton et al., 2013) is a 15-item scale (e.g. "Evidence of alien contact is being concealed from the public" and "Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public"). Responses are rated on 5-point scales ("*Definitely not true*" to "*Definitely true*").The alpha coefficient for the scale was: .95. (Following the findings of Wood et al., (2012) that individuals who

endorse one conspiracy theory are likely to endorse a contradictory conspiracy theory, two additional items were included: “Princess Diana faked her death so that she could retreat into isolation” and “Princess Diana had to be killed because the British government could not accept that the mother of a future king was involved with a Muslim Arab”. Relicating Wood etal’s finding, we found that endorsement of these beliefs was moderately correlated; $r = .39$, $p < .001$. However, these items were not considered in the present analysis because they were not part of the original scale.)

Centrality of Religiosity Scale (CRS; (Huber & Huber, 2012) is a 15-item scale (e.g. “How often do you think about religious issues?”, “To what extent do you believe that God or something divine exists?” and “How often do you take part in religious services?”. Responses for 12 items are rated on 5-point scales (“*Never*” to “*Very often*”). While 3 items only are rated on 8-point scales (“*Never*” to “*Several times a day*”). The alpha coefficient for the scale was: .97.

Social and Political Attitudes Scale .There is considerable debate about the best way to characterise political ideologies, with some researchers arguing for single factor left vs right solutions (Jost et al., 2009) and others advocating for multidimensional accounts (Duckitt & Sibley, 2010). However, we found no widely used political attitude scale suitable for a UK population sample and wished to sample beliefs that are likely to be salient to the UK general public. We therefore developed a 14-item scale based on previous scales by (Wilson & Patterson, 1968) and subsequent variants, e.g. (Everett, 2013). These scales require individuals to indicate their agreement or disagreement with specific politically sensitive

practices, eg. the death penalty, abortion. We excluded items that are irrelevant to the UK political environment (e.g. gun control). Each item was followed by five response options: ranging from "*strongly agree with*" to "*strongly disagree with*".

Exploratory factor analysis in a separate sample of 496 mainly university students suggested a three factor solution: conservativism (e.g. support for the death penalty and monogamy), social liberalism (support for immigration and multiculturalism) and personal liberalism (e.g. support for abortion rights) with eigenvalues of 3.23, 1.189 and 1.68, accounting for 48.53% of the total variance. Alpha coefficients for the subscales in the present study were: .64 for conservatism, .69 for social liberalism and .67 for personal liberalism.

Revised Paranormal Belief Scale (Tobacyk, 2004) is a 26 item scale distributed on 7 different subscales (traditional religious belief, psi, witchcraft, superstition, spiritualism, extraordinary life forms and precognition). In this study items relating only to three of these belief types were used: witchcraft (4 items, e.g. "Black magic really exists" and "There are actual cases of witchcraft"), Superstition (3 items, e.g. "Black cats can bring bad luck" and "The number 13 is unlucky") and precognition (4 items, e.g. "Astrology is a way to accurately predict the future" and "Some psychics can accurately predict the future"). Responses are rated on 7-point scales ("*Strongly disagree*" to "*Strongly agree*"). The alpha coefficient in the present study for witchcraft was .90 for superstition .89 for precognition .88, and for the whole scale was .93.

Cognitive Reflection Test (CRT; (Frederick, 2005) is a 3-item scale in which requires an answer to simple mathematical questions, in which the structure of the question implied the wrong answer, so that the correct answer requires effortful reflection and 'cognitive miserliness' leads to wrong answer e.g. "A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost?". A second version of the scale, the CRT-2 (Thompson & Oppenheimer, 2016) included 4-item scale with a lower degree of mathematical complexity, e.g. "A farmer had 15 sheep and all but 8 died. How many are left?" and we combined both measures to make a 7-item scale. Participants typed their answers into a textbox. To ensure that the participants answered the questions quickly, only 30 seconds from the moment of presentation was allowed for each answer, after which the questionnaire automatically moved to the next item. For scoring, the intuitive incorrect answer = 1, right answer = 2 and any other answers = 0. The alpha coefficient for 1,235 who completed all 7 items was .71.

The Death Anxiety Scale (Tomás-Sábado et al., 2005) is a 17-item scale with four subscales (externally generated death anxiety, death acceptance, death finality and thoughts about death). Responses are rated on 5-point scales ("*Totally disagree*" to "*Totally agree*"). Given the high inter-correlations between subscales, r = .67 – .89, we decided to use the total scale score. The alpha coefficient for the whole sacle was .93.

Analysis plan

Our approach with this dataset was essentially exploratory and iterative. Our models were calculated in Mplus 7.0 (Muthen & Muthen, 2013) using robust maximum likelihood estimation (MLR; (Yuan & Bentler, 2000) and there was no missing data (forced choice rules

in the survey ensured that all participants completed all of the measures). We first compared a confirmatory factor model in which all nine different kinds of belief (paranoia, conspiracy theories, religiosity, social liberalism, personal liberalism, conservatism and belief in witchcraft, superstition and precognition) loaded on separate uncorrelated factors with a bifactor model in which the factors were uncorrelated but all items additionally loaded on an additional general strong belief factor which, in the tradition of previous bifactor analyses (e.g. of intelligence and psychopathology) we designate with the single latter 'S'. When interpreting the comparative fit of the different models we used the following recommended model fit indices (Hu & Bentler, 1999): a non-significant chi-square (χ^2), Comparative Fit Index (CFI: (Bentler, 1990) and Tucker Lewis Index (TLI: (Tucker and Lewis, 1973) values above .95 reflect excellent fit, while values of these two indices above .90 reflect acceptable fit; Root-Mean-Square Error of Approximation with 90% confidence intervals (RMSEA; (Steiger, 1990) with values of .06 or less reflect excellent fit while values less than .08 reflect acceptable fit. The Standardized Root-Mean-Square Residual (SRMR; (Chen, 2007) was also used with values of .06 or less indicating excellent fit and values less than .08 indicating acceptable fit. The Bayesian Information Criterion (BIC; (Schwarz, 1978) was used to evaluate and compare models if models well fitting, with the smallest value indicating the best fitting model. In relation to the BIC, (Raftery, 1996) suggested that a 2-6 point difference offers evidence of model superiority, a 6-10 point difference indicates strong evidence of model superiority, and a difference greater than 10 points indicates very strong evidence of model superiority.

Once the superiority of the bifactor model had been demonstrated, we sought to refine it by eliminating any belief scales with low or negative loadings on the bifactor (indicating that these beliefs were not related to a general tendency towards strong belief).

When we had achieved a final model, we evaluated the reliability and replicability of each dimension in accordance with the recommendations of (Rodriguez et al., 2016) using (Dueber, 2017) software, which we used to calculate the following: omega reliability (ω; the proportion of common variance explained by the general and specific factors); omega hierarchical (ωH; the proportion of variance within the symptom indicators attributable to the general (or specific) factor(s), controlling for the specific (or general) factors), relative omega (ωR: represents the proportion of reliable variance due to the general factor independent of the specific factors, and each specific factor independent of the general factor) and index H (the extent to which a set of items represents a latent variable and the likelihood of that latent variable replicating across studies). Omega coefficients and index H values range from 0–1, and values $\geqslant$ 0.80 reflect satisfactory reliability and replicability. We also report the item explained common variance (I-ECV), which reflects the extent to which an item's responses are accounted for by variation on the latent general dimension alone.

Finally, we used multivariate and bivariate regression models to investigate the effect of age, gender, analytical reasoning and death anxiety on the general and specific factors. Factor scores were used for the latent variables (general and specific factors) and sum scores were used for the observed variables. In these analyses, 282 participants were not included because they failed to complete all CRT items within the 30 seconds time limit. Differences in parameter estimates were tested using Wald tests. If a Wald test was significant, the regression coefficients between the observed variables and the latent variables were considered to be significantly different.

5.3.2 Results

Factor models

Fit indices for a bifactor model including nine belief systems (paranoia, conspiracy mentality, religiosity, witchcraft, superstition, precognition, social liberalism, conservatism and personal liberalism) were χ^2 (1173) = 7278.94, $p < .001$; *RMSEA* = .059; *CFI* = .869; *TLI* = .857, *SRMR* = .073. These were superior to the indices for the CFA model (χ^2 (1188) = 8135.28 , $p < .001$; *RMSEA* = .062; *CFI* = .851; *TLI* = .840, *SRMR* = .067). The BIC was also lower for the bifactor model (*BIC* = 220740.51) compared to the CFA model (*BIC* = 221487.06) and indicates strong evidence of the superiority of the bifactor model. However, despite this superiority, the CFI and TLI for the bifactor model did not reach .90 suggesting that model needed to be modified.

Examination of the factor loadings (see Supplementary Table 5.S1) revealed low loadings on the general factor, but strong loadings on the specific factors, for all three sets of political belief items (social liberalism bifactor range -.149, .043; conservativism bifactor range: -.173, .009; personal liberalism bifactor range: -.053, .085). Interestingly, the majority of these loadings (all but three) are negative, suggesting a negative association between political beliefs and the general factor. The implication of this finding would seem to be that a strong belief factor that is common to the remaining belief systems – paranoia, belief in conspiracy theories, the three kinds of supernatural beliefs and religious ideology – plays little or no role in political ideology. Hence, we recalculated both the CFA and the bifactor models while excluded the political ideology items.

The bifactor model fit indices improved once political beliefs had been removed ; (χ^2 (592) = 4021.75, $p < .001$; *RMSEA* = .062; *CFI* = .914; *TLI* = .903, *SRMR* = .070) and remain better than those for the CFA (χ^2 (614) = 5381.92, $p < .001$; *RMSEA* = .072; *CFI* = .881; *TLI* = .870, *SRMR* = .061). The BIC was lower for the bifactor model (*BIC* = 159329.32) compared to the CFA model (*BIC* = 160528.48) and indicating that, on this index, the former was superior. The standardised factor loadings for the bifactor model latent variables, shown in Table 5.1, were all positive and statistically significant ranging from .202 to .840.

Table 5.1.

Study 1: Standardised factor loadings.

Item	General	Paranoia	Conspiracy mentality	Religiosity	Witchcraft	Superstition	Precognition	I-ECV
1	.28	.55						.21
2	.30	.71						.15
3	.27	.80						.10
4	.27	.71						.13
5	.29	.72						.14
6	.32	.72						.16
7	.20	.50						.14
8	.31	.75						.14
9	.30		.65					.17
10	.33		.66					.20
11	.50		.52					.49
12	.43		.67					.29
13	.33		.63					.22
14	.35		.69					.21
15	.41		.68					.26
16	.52		.49					.53
17	.48		.57					.42
18	.36		.62					.25
19	.36		.73					.20
20	.44		.69					.28
21	.52		.49					.54
22	.38		.66					.25
23	.22		.50					.16
24	.41			.76				.22
25	.46			.72				.29
26	.40			.84				.19
27	.63				.48			.63
28	.72				.54			.64
29	.69				.52			.63
30	.81				-.24			.92
31	.76					.25		.91
32	.75					.84		.46
33	.85					-.02		.99
34	.59						.66	.45
35	.77						.22	.92
36	.72						.51	.67
37	.68						.46	.68

Table 5.2 shows the reliability and replicability estimates for the bifactor dimensions. Most of the dimensions except witchcraft and precognition had satisfactory – or near satisfactory – construct replicability (i.e. index H values ⩾ 0.80) and all had satisfactory – or near satisfactory - reliability (i.e. ω values ⩾0.80). However, witchcraft, superstition and precognition had low levels of replicability, and reliability indicating that these dimensions accounted for very little reliable item variance, adjusting for S.

Table 5.2.

Study 1: Reliability and construct replicability results for the bifactor dimensions of strong beliefs

	S	Paranoia	Conspiracy mentality	Religiosity	Witchcraft	Superstition	Precognition
ω	**0.97**	**0.91**	**0.95**	**0.91**	**0.90**	**0.95**	**0.91**
ωH	**0.68**	**0.78**	**0.67**	**0.70**	**0.16**	**0.16**	**0.28**
ωR	**0.71**	**0.86**	**0.71**	**0.77**	**0.17**	**0.17**	**0.31**
H	**0.95**	**0.89**	**0.91**	**0.83**	**0.54**	**0.71**	**0.59**

Note: ω = omega reliability; ωH = omega hierarchical reliability; ωR = relative omega reliability; H = construct replicability.

Predictors of S

Table 5.3 shows the regression coefficients and tests of equality (Wald test) for multivariate and bivariate regression models in which age, gender, death anxiety and CRT performance were used to predict both the general and specific factors. It will be recalled that we predicted that death anxiety and poor CRT performance would be specifically associated with the general factor.

Age was negatively correlated with S, paranoia, conspiracy mentality, witchcraft and superstition but positively associated with religiosity and precognition in both the bivariate and multivariate models. Female sex was associated with S in both types of analyses, but males scored higher on conspiracy mentality and witchcraft in the multivariate model only. Female sex was associated with paranoia in the bivariate analysis only.

Analytical reasoning was negatively associated with S in both analyses, as we had predicted. However, negative associations of lesser magnitude were also found with conspiracy mentality and, witchcraft in both types of analyses. Moreover, paranoia was positively associated with CRT scores in the multivariate model only, and superstition was negatively associated in the bivariate model only. Death anxiety was strongly associated with S and paranoia and there was a smaller association with conspiracy mentality and witchcraft in both types of models; it was also positively associated with superstition but negatively associated with precognition in the bivariate model.

Table 5.3.

Study 1: standardised regression coefficients and tests of equality from multivariate and bivariate regression models.

		General factor	Paranoia	Conspiracy mentality	Religiosity	Paranormal beliefs			Wald (df) *p*
						Witchcraft	Superstition	Precognition	
		β (se)	β (se)	β (se)	β (se)	β (se)	β (se)	β (se)	
Age	Multivariate	-105(.026)**	-.327(.026)**	-.144(.029)**	.081(.030)*	-.130(.029)**	-.135(.031)**	.178(.028)**	205.73(6) *p <.001*
	Bivariate	-.225(.024)**	-.395(.021)**	-.155(.024)**	.072(.025)**	-.161(.024)**	-.135(.026)**	.171(.024)**	387.23(6) *p <.001*
Gender	Multivariate	-.163(.026)**	.016(.036)	.082(.028)**	-.015(.029)	.076(.028)**	.031(.029)	-.042(.028)	56.17(6) *p <.001*
	Bivariate	-.209(.025)**	-.060(.026)*	.046(.026)	-.028(.026)	.015(.026)	-.002(.026)	-.003(.026)	82.40(6) *p <.001*
CRT	Multivariate	-.156(.025)**	.037(.027)*	-.119(.029)**	-.009(.028)	-.091(.027)**	-.049(.026)	.042(.030)	56.12(6) *p <.001*
	Bivariate	-.225(.027)**	-.001(.029)	-.126(.029)**	-.016(.027)	-.110(.027)**	-.051(.025)*	.043(.030)	81.22(6) *p <.001*
Death Anxiety	Multivariate	.333(.028)**	.271(.029)**	.095(.034)**	.016(.031)	.155(.031)**	.043(.031)	-.057(.030)	207.66(6) *p <.001*
	Bivariate	.417(.024)**	.359(.024)**	.167(.028)**	-.014(.026)	.211(.025)**	.088(.026)**	-.115(.025)**	459.48(6) *p <.001*
R-squared		.232(.022)**	.227(.021)**	.055(.012)**	.006(.004)	.064(.013)**	.025(.009)**	.041(.011)**	167.85(6) *p <.001*

** < .01 * < .05

5.3.3 Discussion of Study 1

In this study we found preliminary evidence for our hypothesised general belief factor S. However, adequate fit indices for the bifactor model were found only when we excluded political beliefs. Furthermore, the reliability of the supernatural beliefs dimensions was low, and the loadings of these items on the specific dimensions were low in the final model. Hence, in this analysis S seemed to be a common process influencing paranoid, conspiracy and religious beliefs, with equivocal contributions to supernatural beliefs. A better test of the validity of the bifactor approach is the relationship with the two variables we had hypothesized would predict S: as expected, both poor CRT performance and death anxiety did, indeed, predict the general factor. However, it is notable that there was also a strong association between death anxiety and paranoia, even in the multivariate model in which the other belief factors were included. Although both CRT scores and death anxiety were also associated with conspiracy mentality, these effects were modest compared to the effects for S and (in the case of death anxiety) paranoia.

These initial findings do not provide unequivocal evidence in favour of S but were sufficiently promising to encourage an attempted replication with a new sample of participants and improved measures. First, we considered the possibility that the failure to find an association between S and political beliefs might have reflected the measure of political beliefs we employed, which focused on specific policies rather than more general political orientation. As alternative political constructs we decided to study nationalism (the uncritical acceptance of the moral superiority and prerogative of one's country in their policies and actions throughout the world, sometimes also called 'blind patriotism') and patriotism (the individual's feelings of love and devotion to and pride in the customs and traditions of one's home country, sometimes also called 'constructive patriotism') (Davidov,

2011; Kosterman & Feshbach, 1989; Mummendey et al., 2001). We tentatively hypothesized that nationalism, because it is associated with social threat, and because analytical reasoning would be required to think realistically about the strengths of other countries, would be more related to S than patriotism.

Secondly, we replaced our short religiosity items with a scale specifically designed for this study, which provides separate measures of religiosity and atheism(Alsuhibani et al., in submission). This measure was developed following philosophical analyses of the atheism construct (e.g. (Gray, 2018) which portrayed it as a positive belief system and therefore not simply the absence of religious belief. Given the considerable evidence cited earlier that religiosity is associated with high death anxiety (Jong et al., 2018) and low analytical reasoning (Pennycook et al., 2016) we hypothesized that religiosity but not atheism would be associated with S.

Additionally, we rewrote our paranoia scale because the items in the short version of the Paranoia and Deservedness Scale employed in Study 1 (e.g. “My friends often tell me to relax and stop worrying about being deceived or harmed”) arguably do not refer to belief in the sense defined in this study. Hence, items were reworded to make them clearly represent propositions about the world (e.g. “It is important to be on guard against being deceived or harmed”).

5.4 Study 2

5.4.1 Methods

Participants

Participants were recruited by the survey company Qualtrics using the same sampling frame employed in Study 2, with participants stratified by sex, age, and household income. 722 UK residents attempted the survey but, after removal of incomplete surveys or surveys completed implausibly quickly (pre-defined following pilot work by the survey company as < 15 minutes) the final sample was 638. Of these, 296 (46.4%) were male with a mean age of 46.60 years (*SD* = 15.83) and 342 (53.6%) were female with a mean age of 43.77 years (*SD* = 16.16).

Measures

The following measures were the same as those in Study 1: the 15-item of the Generic Conspiracist Beliefs Scale employed in Study 1 (α = .96), the 11-item of the Revised Paranormal Belief Scale (α = .89 for witchcraft: .90 for superstition, .88 for precognition and .93 for the whole scale) and the 17-item Death Anxiety Scale (α = .95)

The following new measures were employed in this study:

The revised Paranoia Scale designed especially for this study was based on the PaDS employed in Study 1, but items were rewritten so that each contained a specific proposition formatted similarly to the items of the GCBS, and with an identical response format. There were 8 items, 2 for each of the domains of paranoia identified by (Bebbington et al., 2013): interpersonal sensitivity ("There is a risk that I will be criticised or rejected in social

situations"); mistrust ("You should only trust yourself"); ideas of reference ("When I am out in public, people sometimes talk about me") and fear of persecution ("Some people want to hurt me deliberately"). Coefficient alpha for the scale was .85.

Monotheism and Atheism Beliefs Scale. This is an 18-item scale, with 11 items measuring religiosity and 7 items measuring atheistic beliefs. The items were selected following an exploratory factor analysis of a convenience sample of 488 mainly educated and professional respondents to a social media invitation (see (Alsuhibani et al., in submission) for details and confirmatory factor analysis of factor structure based on the data from this study). Responses were made on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The alpha coefficient for the monotheism subscale was .96 and for atheism was .83.

Nationalism and Constructive Patriotism. Items were adapted from those used in the International Social Survey Programme (Davidov, 2011). Constructive Patriotism was measured by three questions: ''How proud are you of Britain in the way democracy works?''; ''How proud are you of Britain National Health Service?''; and ''How proud are you of Britain's fair and equal treatment of all groups in society?'' These were measured on a 4-point scale ranging from 1 (*not proud at all*) to 4 (*very proud*). Nationalism was measured by two statements: ''The world would be a better place if people from other countries were more like the British'' and ''Generally speaking, Britain is a better country than most other countries''. They were measured on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Cognitive Reflection Test (CRT; Fredrick, 2005) was expanded to include 4-items from (Toplak et al., 2014) and 3-items from (Thomson & Oppenheimer, 2016). This version used the four-option multiple choice format with choices presented in random order as recommended by Sirota and Juanchich (2018); 45 seconds was allowed for each answer, after which the questionnaire automatically moved to the next item. The alpha coefficient for 597 who completed all 10 items was .70.

Analysis plan

As in Study 1, we first compared a confirmatory factor model in which all seven different kinds of belief (paranoia, conspiracy theories, religiosity, atheism, constructive patriotism, nationalism, witchcraft, superstition and precognition) loaded on separate uncorrelated factors with a bifactor model in which all items additionally loaded on a general strong belief factor. Once the superiority of the bifactor model had been demonstrated, we sought to refine it by eliminating belief scales with low or negative loadings on the bifactor (indicating that these beliefs were not related to a general tendency towards strong belief); we had hypothesized in advance that these would be items from the atheism and patriotism measures. Then, we followed the analysis plan used in study 1 to investigate the associations of S with the specific factors on age, gender, analytical thinking and death anxiety.

5.4.2 Results

Fit indices for a bifactor model including nine belief systems (paranoia, conspiracy mentality, religiosity, atheism, witchcraft, superstition, precognition, constructive patriotism

and nationalism) were (χ^2 (1483) = 4481.83, p < .001; *RMSEA* = .056; *CFI* = .888; *TLI* = .879, *SRMR* = .086) and superior to the CFA model (χ^2 (1504) = 4838.25, p < .001; *RMSEA* = .059; *CFI* = .875; *TLI* = .868, *SRMR* = .064). The BIC was also lower for the bifactor model (*BIC* = 96111.99) compared to the CFA model (*BIC* = 96332.68) and indicates very strong evidence of the superiority of the bifactor model, although the CFI and TLI did not reach .90.

Examination of the factor loadings (see supplementary Table 5.S3) revealed low loadings on the general factor (bifactor loadings -.085, .048), but strong loadings on the specific factors for the constructive patriotism items. The implication of this finding would seem to be that constructive patriotism is not related to S as we had hypothesized. We had also hypothesised that atheism would not be related to S, in fact five of the items loaded negatively on S and the two items with positive loadings were nonsignificant. A plausible explanation for this pattern of results is that atheism requires the suppression of the strong belief factor.

When we recalculated both the CFA and the bifactor models while excluded the atheism and constructive patriotism items we found that the bifactor model fit indices have improved and remain better than those for the CFA. In the revised bifactor model, the fit indices were acceptable (χ^2 (988) = 3109.47, p < .001; *RMSEA* = .058; *CFI* = .913; *TLI* = .905, *SRMR* = .070) and much improved from the CFA model (χ^2 (1014) = 3784.61, p < .001; *RMSEA* = .065; *CFI* = .886; *TLI* = .879, *SRMR* = .066). The BIC was also lower for the bifactor model (*BIC* = 76250.18) compared to the CFA model (*BIC* = 76757.41) and indicates strong evidence of the superiority of the bifactor model. The standardised factor loadings for the bifactor model latent variables (see Table 5.4) were all positive except for two of the four precognition items. All items loaded on the general factor with the exception of one paranoia item.

Table 5.4.

Study 2: Standardised Factor Loadings

Item	General	Paranoia	Conspiracy mentality	Nationalism	Religiosity	Witchcraft	Superstition	Precognition	I-ECV
1	-.07	.37							.03
2	.38	.49							.38
3	.17	.74							.05
4	.27	.66							.14
5	.25	.74							.10
6	.39	.65							.26
7	.29	.42							.33
8	.26	.68							.13
9	.37		.68						.23
10	.43		.68						.29
11	.65		.44						.68
12	.58		.58						.50
13	.48		.59						.40
14	.48		.61						.38
15	.52		.63						.41
16	.68		.41						.73
17	.59		.51						.57
18	.49		.54						.45
19	.49		.68						.34
20	.55		.63						.43
21	.65		.46						.67
22	.52		.61						.43
23	.23		.52						.16
24	.18			.90					.04
25	.11			.74					.02
26	.49				.47				.53
27	.52				.64				.40
28	.53				.66				.40
29	.48				.76				.28
30	.44				.75				.26
31	.50				.52				.48
32	.55				.70				.39
33	.52				.55				.47
34	.49				.80				.27
35	.49				.81				.27
36	.55				.58				.48
37	.68					.42			.72
38	.58					.62			.47
39	.83					.18			.96
40	.66					.58			.56
41	.73						.36		.80
42	.81						.39		.81
43	.76						.42		.77
44	.85							-.05	.99
45	.87							-.10	.98
46	.76							.23	.92
47	.70							.82	.42

Table 5.5 shows the reliability and replicability estimates for the bifactor dimensions. Most of the dimensions except witchcraft and superstition had satisfactory – or near satisfactory – construct replicability (i.e. index H values $\geqslant$ 0.80). Moreover, all the bifactor dimensions had satisfactory – or near satisfactory - reliability (i.e. ω values $\geqslant$ 0.80) but witchcraft, superstition and precognition had extremely low values for ωH and ωR, indicating that these dimensions accounted for very little reliable item variance when adjusting for S.

Table 5.5.

Study 2: Reliability and construct replicability results for the bifactor dimensions of strong beliefs.

	S	Paranoia	Conspiracy mentality	Religiosity	Nationalism	Witchcraft	Superstition	Precognition
ω	0.98	0.86	0.96	0.96	0.82	0.90	0.90	0.94
ωH	0.77	0.73	0.53	0.60	0.79	0.27	0.19	0.07
ωR	0.78	0.78	0.55	0.63	0.97	0.30	0.21	0.08
H	0.97	0.97	0.89	0.91	0.84	0.58	0.35	0.69

Note: ω = omega reliability; ωH = omega hierarchical reliability; ωR = relative omega reliability; H = construct replicability.

Predictors of S

Table 5.6 shows the regression coefficients and tests of equality (Wald test) from multivariate and bivariate regression models. Age was negatively correlated with paranoia, conspiracy mentality and superstition, and positively correlated with nationalism, witchcraft, and precognition in both regression models. It also had a positive correlation with religiosity in the multivariate model only, while it was negatively significant with "S" in

the bivariate model only. Male gender was positively associated with nationalism, and negatively with precognition in both regression models but female gender was associated with S in the bivariate model only.

Analytical reasoning was negatively associated with S and, less strongly, with religiosity in both regression models, but there was also a small negative association with nationalism in the multivariate model only. Conspiracy mentality was negatively associated with analytical reasoning and witchcraft had a small positive association with CRT scores in the bivariate model only.

Death anxiety was strongly associated with S. There were also positive associations of smaller magnitude with paranoia, conspiracy mentality and religiosity, but death anxiety was negatively correlated with witchcraft in both regression models. There were also small positive associations with nationalism in the multivariate model, and with superstition in the bivariate model.

Table 5.6.

Study 2: standardised regression coefficients and tests of equality from multivariate and bivariate regression models.

		General factor	Paranoia	Conspiracy mentality	Religiosity	Nationalism	Paranormal beliefs			Wald (df) *p*
							Witchcraft	Superstition	Precognition	
		β (se)	β (se)	β (se)	β (se)	β (se)	β (se)	β (se)	β (se)	
Age	Multivariate	-.013(.035)	-.110(.042)*	-.115(.039)**	.100(.039)*	.234(.039)**	.257(.038)**	-.132(.044)**	.268(.041)**	123.49(7) *p <.001*
	Bivariate	-.198(.036)**	-.158(.039)**	-.161(.035)**	.031(.039)	.188(.035)**	.255(.035)**	-.154(.040)**	.239(.038)**	199.08(7) *p <.001*
Gender	Multivariate	-.023(.034)	.056(.040)	.048(.039)	-.030(.040)	.198(.038)**	-.065(.040)	.034(.040)	-.111(.040)**	36.01(7) *p <.001*
	Bivariate	-.167(.077)*	.070(.073)	.041(.075)	-.106(.076)	.345(.072)**	-.030(.068)	.010(.060)	-.199(.089)*	38.45(7) *p <.001*
CRT	Multivariate	-.222(.032)**	.077(.041)	-.049(.039)	-.117(.041)**	-.095(.038)*	.070(.042)	-.001(.039)	.016(.044)	67.28(7) *p <.001*
	Bivariate	-.326(.034)**	.037(.041)	-.091(.039)*	-.139(.041)**	-.074(.039)	.092(.042)*	-.031(.038)	.026(.043)	113.97(7) *p <.001*
Death Anxiety	Multivariate	.475(.038)**	.162(.047)**	.162(.046)**	.142(.044)**	.141(.045)**	-.003(.045)**	.091(.047)	.032(.044)	111.27(7) *p <.001*
	Bivariate	.530(.032)**	.181(.043)**	.191(.041)**	.142(.042)**	.077(.041)	-.102(.042)*	.114(.040)**	-.038(.041)	218.48(7) *p <.001*
R-squared		.328(.035)**	.050(.018)**	.058(.019)**	.041(.015)**	.102(.023)**	.075(.020)**	.033(.014)*	.076(.021)**	95.86(7) *p <.001*

** < .01 * < .05

5.4.3 Discussion of Study 2

In study 2 we sought to replicate the findings from Study 1 using improved measures, and specifically hypothesized that S would be related to nationalism but not patriotism, and religiosity but not atheism. In general, the hypotheses were supported and the overall fit of the final bifactor model was excellent. Death anxiety and analytical reason were much stronger predictors of S than any other dimension. However, the supernatural belief dimensions, which we measured in the same way as in Study 1, showed low levels of reliability when accounting for S and, therefore, the place of these beliefs within a bifactor framework remains uncertain.

5.5 General Discussion

In this paper we have proposed that many strongly held beliefs that are resistant to counter-argument can be described as master explanatory systems (Bentall, 2018) and that these systems may be at least partially explicable in terms of a latent psychological propensity or set of processes that facilitate strong beliefs in general. We further hypothesized that two constructs – death anxiety and poor analytic reasoning would be associated with this propensity. We sought to test this account by evaluating bifactor models in which different kinds of master explanatory systems – paranoia, belief in conspiracy theories, political ideology, religious belief and belief in the supernatural – were each explained by their own latent factors but also by a common strong belief factor, which we have dubbed S, associated with the items in all of the scales. We tested this model in two samples, both fairly representative of the UK population. Although we had clear hypotheses at the outset, our approach was exploratory as we sought to identify exceptions to this account (beliefs that did not fit into a bifactor framework) and modify the models accordingly.

Overall, our findings provide cautious, but not unequivocal support for our hypotheses. In both studies, the bifactor model of strong beliefs was superior to the equivalent confirmatory factor analysis model, and the fit statistics for the final model suggested good fit. In Study 1, this required the exclusion of the political belief items, which were drawn from a questionnaire which was specifically developed for this study and may not have been ideal for our purpose. In the second study, we had hypothesized in advance that patriotism and atheism would be constructs that would not fit well into a bifactor framework and, indeed, this proved to be the case.

Although, the reliability and replicability analyses were acceptable for the general dimension, some of the specific dimensions showed a questionable reliability and replicability in both studies. The general dimension accounted for 95% of reliable variance in study 1 and 97% of reliable variance in study 2. However, when the variance attributable to the general dimension was partitioned out, the paranormal beliefs dimensions (for study 1: witchcraft 17%, superstition 17%, and precognition 31%, and for study 2: witchcraft 30%, superstition 21%, and precognition 8%) explained little reliable variance compared to the other beliefs (i.e. paranoia, conspiracy mentality, religiosity, and nationalism). One way of interpreting these findings would be to say that these constructs are almost pure S – they are beliefs that are driven by the general dimension and very little influenced by belief-specific factors. We found consistent results with respect to predictors of S across the two studies; it was negatively associated with age and female gender and, as we had hypothesized at the outset, negatively associated with analytical reasoning and positively associated with death anxiety.

The former relationship replicates many previous studies which have shown an association between poor analytic reasoning and specific strongly held belief systems, such

as religious beliefs (Pennycook, 2012), conspiracy theories (Swami et al., 2014), paranoid beliefs (Bronstein et al., 2019), and paranormal beliefs (Pennycook et al., 2012). The association with death anxiety is consistent with the literature on mortality salience (Solomon et al., 2015), which suggests that belief in a worldview can protect individuals against the anxiety associated with mortality and that the contemplation of one's mortality, for example prompted by an experimental mortality salience intervention, can lead to world view defence (Greenberg et al., 1997). (It should be noted here that the replicability of this mortality salience effects has been questioned (Klein et al., 2020).)

We must acknowledge that, in our multivariate models of predictors of S, although the general factor was predicted by both of these variables in line with our hypotheses, there were also residual effects on specific belief systems. In study 1, there was an effect of these two variables mainly on paranoia in addition to the effects on S. In study 2 there were residual effects on most of the specific factors, but these were very small in magnitude compared to the effect on S.

This study has several strengths. First, there were large representative samples of the UK population in both studies. Second, a wide range of beliefs was used in testing the bifactor models. Third, the replication study has confirmed the major findings in the first study. On the other hand, in Study 1 we chose measures of political ideology and religiosity that may not have been best suited to test our models. The fact that our approach was exploratory in terms of the inclusion and exclusion of variables during model fitting raises the possibility that we have over-fitted the data and a pre-registered replication in a larger sample should be a priority for further research. Finally, although we were inspired to carry out this research by wondering what the unique features of delusions were (if any), we did not test clinical samples and so our data does not resolve the question of the distinction

between pathological and non-pathological beliefs. There have been very few studies of analytical reasoning in patients suffering from psychosis (Freeman et al., 2014) and, so far as we are aware, no specific studies of death anxiety in relation to psychosis although death anxiety has been shown to be elevated in psychiatric patients in general in comparison with healthy people (Menzies et al., 2019). It is therefore possible that S is one factor that contributes to delusional beliefs but there are other factors that make those beliefs uniquely delusional.

Arguably, strong belief is a ubiquitous phenomenon – all of the belief systems we have studies are prevalent globally – but also a phenomenon that leads to much strife and human suffering: for example, through the violence associated with terrorism and warfare, the stifling of views that are regarded as heretical, the justification of discrimination of specific racial, sexual or cultural minorities, or simple distrust between people who hold different belief systems. We are of course not arguing that people should not have worldviews or strong beliefs. However, understanding the psychological processes that propel people to hold strong beliefs in general may provide clues about how to promote tolerance of a diversity of beliefs and hence a kinder, happier world.

Chapter 6: Could Mortality Salience Enhance Strong Beliefs?

6.1 Abstract

A core tenet of terror management theory is that mortality salience (MS) strengthens individuals' worldview defence. In earlier studies, we found that the associations between different kinds of strongly held belief systems (i.e., paranoia, conspiracy theories, political ideology, religiosity and belief in the supernatural) can be explained by a common latent factor, which we described as 'S', and further, that this factor is positively associated with death anxiety. The present study examined whether this factor is enhanced following MS manipulation. We conducted an online experimental study involving 245 participants who were divided into two group (123 in the MS group and 122 in the experimental group) and found that MS manipulation increased the participants' death anxiety, decreased their analytical reasoning according to the Cognitive Reflection Test (CRT) and enhanced S. An important novel finding was that some participants, especially those in the MS condition, failed to adhere to the experimental protocol. When those participants were compared with the compliant participants by means of a two-way ANOVA that also included the group condition, a main effect for the group condition but no effect for compliance was found in the case of the CRT. Moreover, in relation to death anxiety, the experimental effect remained, although the non-compliant participants also showed greater death anxiety than the compliant participants. In the case of S, there was a strong effect for the non-compliant participants scoring higher, although the effect for the experimental manipulation narrowly failed to reach the level of significance. In conclusion, strong beliefs can be impacted by thoughts of death.

6.2 Introduction

Pathological beliefs, which in the psychiatric literature are also known as delusions, are defined in the DSM-5 (APA, 2013) as 'Fixed beliefs that are not amenable to change in light of conflicting evidence'. However, it has long been recognised that it is difficult to distinguish between pathological and non-pathological beliefs on the basis of their epistemic characteristics (Sullivan-Bissett et al., 2017). Moreover, epidemiological evidence indicates that these kinds of beliefs are much more common than the psychiatric admission statistics imply (van Os, 2000). Thus, it is reasonable to search for common factors involved in all kinds of beliefs that are emotionally charged, held with strong conviction and resistant to change. Such beliefs, which have been described as MES (because they afford an explanatory framework that is pertinent to a wide range of real-life experiences; Bentall, 2018), include religious and political ideologies.

In two recent studies, Alsuhibani et al., (manuscript submitted for publication) sought to determine whether there are any common mechanisms underlying the most common types of delusional systems, paranoia and other MES beliefs (i.e. paranoia, conspiracy theories, religiosity, nationalism and paranormal beliefs). They did so by testing whether survey data collected from representative samples of the UK population fitted a bifactor model that assumes that different types of beliefs can be explained by specific factors related to each system as well as by a common general factor that affects them all, a latent strong beliefs factor termed 'S' (for strong belief). In both studies, the bifactor model proved superior to confirmatory factor analysis models that treated the specific belief systems as independent factors. Further investigation revealed that the latent factor S was strongly associated with poor analytical reasoning (as measured using the CRT; Sirota & Juanchich, 2018) and positively associated with death anxiety, although these two variables had very little influence on the

specific belief factors. Hence, death anxiety (positively) and analytic reasoning (negatively) appeared to operate through S to render any belief system held by the individual stronger.

6.2.1 Terror Management Theory (TMT)

TMT is a social psychological theory that attempts to explain the relationship between anxiety regarding death and various psychological and social phenomena (Solomon et al., 2015). According to the theory, many cultural phenomena play a role in minimising the fear of death. Culture provides people with a purpose in life and also prescribes beliefs and practices that influence behaviour and expectations, thereby diverting people from the existential terror of death. Most cultures view death as the final step after living a normalised life that promises fulfilment in humans (Burke et al., 2010). Many cultures also promote belief in the immortality of humans (Wolfe & Tubi, 2019), and such beliefs provide comfort in relation to the dreaded event that is death. Beliefs such as reincarnation, afterlife and heavenly souls are developed through religion and culture, and their main goal is to mitigate people's existential terror (Juhl & Routledge, 2016). Symbolically, people manage the fear of death by developing perceptions of the continuity of their existence after death, particularly through their children, being a member of a particular tribe or culture and the legacy that they intend to leave behind (Darrell & Pyszczynski, 2016). Such beliefs are meant to provide people with a sense of security in life, and they are quite extensive today due to the development of numerous cultural beliefs worldwide (Routledge & Vess, 2018).

6.2.2 Worldview Defence

One of the core principles of TMT is that people need to sustain their faith in a meaningful worldview (Lifshin et al., 2017) in order to have a positive outlook on life and to believe that

there is a purpose to their existence (Arndt & Goldenberg, 2017). Another core principle of TMT is the belief that individuals are valued within the context of a meaningful worldview (Greenberg et al., 2016). At its heart, this requires that the worldview constructed by individuals places them at the centre of natural events that take place around them (Wolfe & Tubi, 2019). This corresponds with the concept of self-esteem, and it implies that people need to develop a perception of the self as an important entity in life (Pyszczynski et al., 2019). Believing in one's self-worth is, therefore, integral to protecting the mind from overthinking about the finiteness of life (Yetzer et al., 2018).

For this reason, it is expected that people will act to defend their cultural worldview when their MS is threatened (Florian et al., 2001). In a meta-analytic integration of published studies that have tested this hypothesis, Burke et al., (2010) found a robust effect size for the MS manipulations (r = .35). However, all the included manipulations were very similar, typically requiring participants to spend a brief period contemplating their own death. Thus, it is possible that the results would not be replicated in real-life near-death experiences, which prompt many people to re-evaluate their values, rejecting cultural ones and embracing more personal ones (Martin et al., 2004).

If MS does indeed strengthen individuals' worldview defence, given that individuals' worldviews differ, it presumably must do so through the common mechanism S that underlies all worldviews (that the present study terms MES).

6.2.3 Purpose of the Study

This experimental study sought to test the hypothesis that MS increases the strong belief factor S. Thus, we measured S in the participants after they had been induced to think about their own death or a non-mortality threatening aversive experience (undergoing a dental

procedure; the control condition). We also assessed the impact of MS on the two factors we previously identified as being predictive of S, namely death anxiety (based on the expectation that it should be increased by MS, which can be considered a manipulation check) and analytical reasoning (a previous study found that mortality salience leads to a decrease in analytic reasoning; Trémolière et al., 2013).

6.3 Methods

6.3.1 Participants

The participants were recruited, and the study administered online by the survey company Qualtrics using the same sampling frame as employed in the previous study, with the participants being stratified by sex, age and household income. Some 450 UK residents attempted the survey, with 245 actually completing it. Non-completion occurred due to the failure to get to the end of the survey or due to exclusion because of a duplicated Internet Protocol address associated with identical age and sex. Of the participants who completed the survey, 118 (48.2%) were male and had a mean age of 31.13 years (*SD* = 14.56), while 127 (51.8%) were female and had a mean age of 24.46 years (*SD* = 16.72).

6.3.2 Measures

We used the most widely employed form of MS priming manipulation (Rosenblatt et al., 1989), which consists of two open-ended questions: 'Please briefly describe the emotions that the thought of your own death arouses in you' and 'Jot down, as specifically as you can, what you think will happen to you as you physically die'. For the aversive control condition, the word 'death' was replaced with 'dental pain' in the two open-ended questions (i.e., 'Please briefly describe the emotions that the thought of dental pain arouses in you' and 'Jot down,

as specifically as you can, what you think will happen to you as you are physically experience dental pain'. To ensure that the participants spent sufficient time on the task, they were asked to write a minimum of 300 characters (4–5 sentences) for each question.

To prevent the activation of defensive processes that might prevent the detection of a MS effect, previous researchers have recommended that participants be required to complete distraction and delay tasks prior to completing the outcome measure and, further, that such tasks should not be too complicated, too long or related to thoughts of death (Pyszczynski, 1999; Solomon et al., 2015). In Burke et al.'s (2010) meta-analysis, the effects of MS were found to be greater after a delay.

In the present study, we used two delay tasks. First, we asked the participants to read a short passage from 'The Growing Stone', a story included in the collection *Exile and the Kingdom* by Albert Camus (1957) (Greenberg et al., 1994). The passage was chosen because it was recommended as a delay task on the Terror Management Theory website (https://tmt.missouri.edu/materials.html) and describes a scene at night (Table 6.S1). Second, we used the Positive and Negative Affect Schedule (PANAS), as it is the delay task most commonly used in relation to MS manipulation (Burke et al., 2010).

During a preliminary inspection of our data, we noticed that some participants did not adhere to the experimental protocol, typically through writing about topics other than death or dental pain. In a post-hoc analysis, the answers given during the MS and control tasks were, therefore, reviewed by the first author and assigned a score of 1 = valid response (for those who completed the task by writing a minimum of 300 characters that were entirely on topic), 2 = partially valid response (partially on topic but not all 300 characters pertaining to the topic) or 3 = invalid response (response entirely off topic). These scores were then used to divide the participants into subgroups, namely those who adhered to the protocol (a score of 1 on

for least one of the conditions) and those who showed poor adherence (a score of 3 for at least one of the conditions).

The PANAS (Watson et al., 1988) consists of two ten-item scales designed to measure the mood dimensions of positive and negative affect. The participants are presented with single mood descriptors (e.g., excited) and then asked to rate, on a five-point scale ranging from 'very slightly or not at all' to 'very much', the extent to which they feel each of the mood states 'right now'. The alpha coefficient in this study for positive affect was .85, while for negative affect it was .91.

The Strong Beliefs Scale is 25-item scale designed especially for use in this study. It was derived from the bifactor model described in Alsuhibani et al. (manuscript submitted for publication). We chose the two items that loaded the highest on the strong belief factor from each of the scales, namely PADS (e.g. 'When I am out in public, people sometimes talk about me'), GCBS (e.g. 'Secret organisations communicate with extra-terrestrials but keep this fact from the public'), paranormal beliefs (e.g. 'A horoscope can accurately tell person's future'), religiosity (e.g. 'God sometimes reveals His will directly to human beings'), nationalism (e.g. 'Generally speaking, Britain is a better country than most other countries') and patriotism (e.g. 'I love my country'). The participants' responses were rated on five-point scale ranging from 'strongly disagree' to 'strongly agree'. The alpha coefficient for the scale was .91. However, because we were interested in the latent construct S, we performed a confirmatory factor analysis in Mplus 7.0 (Muthen & Muthen, 2013) with a robust maximum likelihood estimation (MLR; Yuan & Bentler, 2000) to obtain the factor scores for the strong beliefs scale.

The CRT (Sirota & Juanchich, 2018) is a seven-item scale, to which we added a further three items derived from the work of Thomson and Oppenheimer (2016). The resultant ten-

item scale used a four-option multiple choice format with the choices presented in a random order, as recommended by Sirota and Juanchich (2018). The alpha coefficient was 0.74.

The Death Anxiety Inventory (Tomás-Sábado et al., 2005) is a 17-item scale featuring four subscales (Externally Generated Death Anxiety, Death Acceptance, Death Finality and Thoughts About Death). The participants' responses were rated on a five-point scale ranging from 'totally disagree' to 'totally agree'. The alpha coefficient for the total scale was .93, while the subscales' alphas were .75 for Externally Generated Death Anxiety, .83 for Death Acceptance, .86 for Death Finality and .82 for Thoughts About Death. Given the high inter-correlations between the subscales (r = .58 – .78), we decided to use the total scale score.

6.3.3 Procedure

The information page informed the participants that the survey was designed to investigate why people hold strong beliefs about religion, politics and the world. After providing informed consent, the participants were randomly assigned to either the MS priming manipulation or the dental control priming using the randomisation procedure in the Qualtrics software. After the priming task, the participants completed the 'The Growing Stone' and the PANAS as filler tasks, before completing the strong beliefs questionnaire, the CRT and (because we worried that including it earlier might represent an MS) the Death Anxiety Inventory.

6.3.4 Analysis

We used an independent-samples T-test to compare the mean scores for the PANAS, Death Anxiety Inventory, CRT and Strong Beliefs Scale between the two experimental groups (MS and control). Then, to explore the impact of adherence or non-adherence to the priming protocol, we used a two-way between-subjects ANOVA with the group (MS vs control) and adherence vs non-adherence to protocol as factors. All the analyses were conducted using IBM SPSS Statistics version 25.

6.4 Results

The means and *SD*s for the dependent variables are presented in Table 6.1, which also shows the confidence intervals for the differences between the groups. The results of the Levene's tests of the inequality of the variances were all non-significant. There were significant differences found between the groups in terms of the scores, the MS group scored higher and positive mean in the negative affect PANAS ($t(243) = 2.46$, $p = .015$), Death Anxiety Inventory ($t(243) = 3.13$, $p = .002$) and CRT ($t(243) = -2.75$, $p = .006$), while a just significant effect was found for the Strong Beliefs Scale ($t(243) = 1.98$, $p = .049$). Given that multiple tests used in those comparisons, the final comparison for strong beliefs should be treated with extreme caution. See discussion section for more on this point.

Table 6.1

Descriptive Statistics and Confidence Intervals for the MS and Control Groups

		N	Mean	SD	Mean Difference	95% CI of the Diff. Lower	95% CI of the Diff. Upper
Strong Beliefs	**MS**	123	0.12	0.97	0.243	0.001	0.485
	Control	122	-0.12	0.95			
Positive Affect	**MS**	123	28.24	7.98	0.662	-1.385	2.709
(PANAS)	**Control**	122	27.58	8.29			
Negative Affect	**MS**	123	22.19	9.79	2.982	.590	5.374
(PANAS)	**Control**	122	19.20	9.21			
Death Anxiety	**MS**	123	50.67	14.68	5.806	2.151	9.461
	Control	122	44.87	14.36			
Cognitive	**MS**	123	10.35	3.71			
reflection test	**Control**	122	11.65	3.67	-1.298	-2.227	-0.369
(CRT)							

When we compared the two groups (MS and control) with regard to the quality of their answers during the priming task, we found that the MS group failed to complete the task properly (38/123) more frequently than the control group (21/122) (χ2 (1, N=123) = 6.27, p = 0.012).

The groups' scores in the two conditions, when broken down according to whether they adhered or did not adhere to the experimental protocol, are presented in Figure 6.1. The two-way ANOVA (group x adherence) for death anxiety revealed a significant experimental effect (F(1, 245) = 6.261, p = .013) as well as greater death anxiety in those who failed to adhere to the protocol (F(1, 245) = 6.825, p = .010). However, the interaction between the

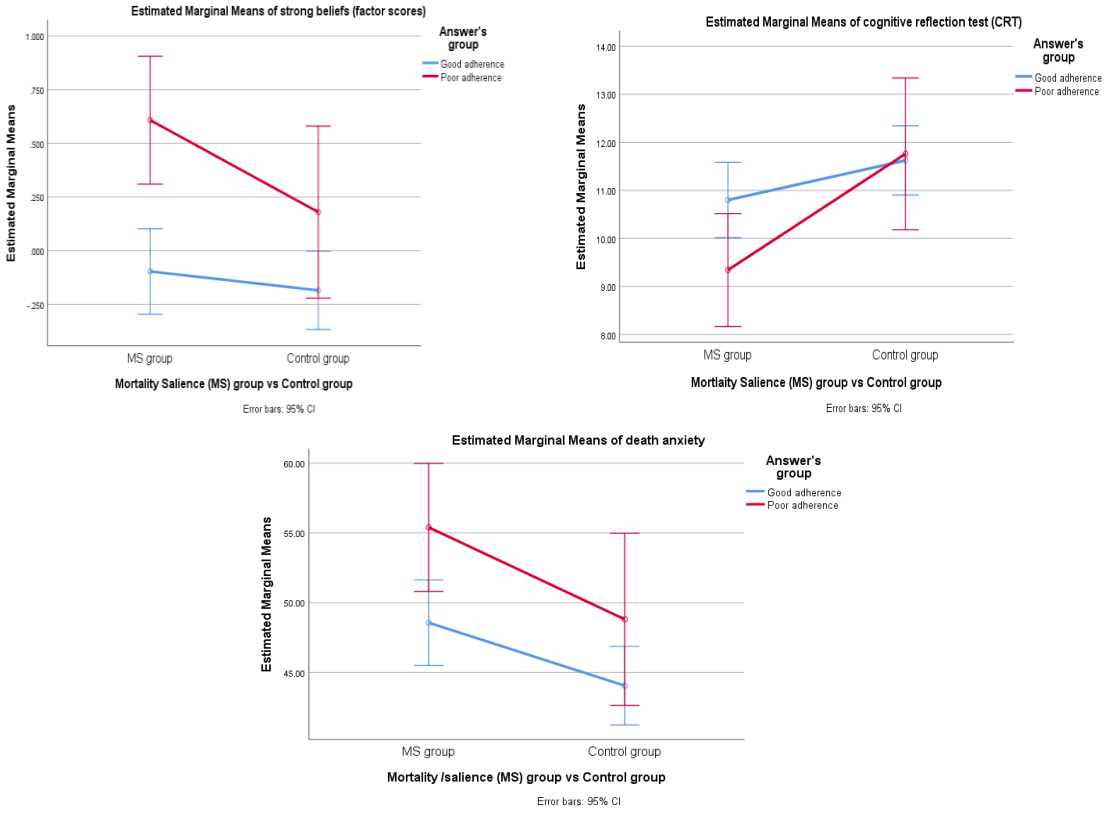
experimental group and the answer type was found to be non-significant (F(1. 245) = .218 p = .641).

A comparable analysis concerning the CRT revealed a significant effect for the experimental group (F(1, 245) = 8.146, p = .005), although the adherence effect and the interaction between the experimental group and adherence were not found to be significant (F(1, 245) = 1.349, p = .247 and F(1, 245) = 1.972, p = .161, respectively).

Finally, the two-way ANOVA concerning strong beliefs showed a strong effect for adherence (F(1, 245) = 13.756, p < 0.001) with a narrowly non-significant effect for the experimental condition (F(1, 245) = 3.211, p = .074) and a non-significant effect for the interaction (F(1, 245) = 1.394, p = .239).

Figure 6.1

Estimated Marginal Means for Answer Groups (Good Adherence and Poor Adherence)



6.5 Discussion

Although previous studies of MS found it to exert non-significant effects on the PANAS (Tremayne & Curtis, 2007; Trémolière et al., 2013), the present study found that the MS group reported higher negative affect when compared with the control group. This arises the questions around the distraction task and whether it is appropriate to be used as a distraction or not. Despite this inconsistency with previous reports, the findings of this study indicate that the MS manipulation represented an effective emotional stimulus. Also, the MS manipulation increased death anxiety, poor analytical reasoning CRT, and enhanced S.

Only a few prior studies have employed death anxiety as an outcome variable following MS interventions, probably because terror management theorists (e.g. Greenberg et al., 1997) have tended to assume that worldview defence serves to prevent death anxiety from being experienced. However, Routledge et al. (2013) observed an effect on death anxiety, albeit only in those participants who reported a low personal need for structure (i.e. who did not exhibit a tendency to seek out clear and certain perceptions of the world). In this study, we did not measure the need for structure, and higher death anxiety was observed in those participants who had experienced the MS intervention. Our analytical reasoning results were consistent with those of Trémolière et al. (2013), with thoughts of death being found to be associated with poor analytical reasoning in the MS group. In the group comparisons, a weak effect was noted on the strong belief factor S, as we had hypothesised.

An interesting complication arose in this study from the observation that some participants failed to adhere to the study protocol, which was especially common in the MS group. The fact that there was a main effect with regard to adherent vs non-adherent participants on death anxiety represents strong evidence that non-adherence is associated with the inability to tolerate aversive and death-related thoughts. In the case of analytic

reasoning, adherence vs non-adherence did not appear to modify the effect of MS. Indeed, the participants in the MS condition performed worse irrespective of whether they followed the protocol or not. In relation to the strong belief factor, S, however, a very strong effect on the part of adherence was found, implying that the worldview defence was especially strong in those who were intolerant of death anxiety. A trend was noted in the expected direction of the intervention effect, although it failed to reach significance.

Overall, the findings of this study provide partial support for our hypothesis that thoughts regarding death can impact the mechanisms linked to strong belief in general, although they also raise a number of further questions. First, no previous research has considered compliance vs non-compliance with regard to the experimental protocol and the possibility that non-compliance is related to intolerance of death-related thoughts (Pyszczynski, personal communication). Thus, our observations concerning this effect are novel and potentially informative with regard to the mechanisms underlying MS, although they still require replication. Second, it is unclear whether any effect on S is mediated by increased death anxiety and impaired analytical reasoning. As these measures were administered after the measurement of S, it was not appropriate to conduct a mediational analysis, although this should be addressed in future research.

It is important to recognise that this study had a number of strengths and limitations. The major strength of the study was the fact that it involved a larger and more representative sample than in many previous MS studies. It could be argued that online presentation is a weakness, although such an approach ensured that experimenter cuing effects were eliminated, which could be seen as a strength. Another limitation is that we used four t- tests to compare group outcomes (scores on PANAS, death anxiety, CRT, strong beliefs), raising the risk of type-1 error proliferation (spurious differences). Bonferroni correction (which is hyper-

conservative) would give a critical p value of 0.05/4 = 0.0125. Therefore, the differences observed, especially on the strong beliefs measure, should be treated with considerable caution. Also, the answers of the MS manipulation would be better if they were reviewed by an independent rater (blind to the hypotheses) rather than the first author. Finally, we did not administer our outcome measures prior to the experimental manipulation because parallel forms were not available for death anxiety or S and because we feared that presenting the Death Anxiety Scale would prime MS effects and, therefore, undermine our ability to detect group differences. As a consequence, we could only make group comparisons and so were unable to observe any pre-to-post changes in our dependent measures. In future studies, this problem could be solved by developing parallel form measures of S and death anxiety and then administering them some time (perhaps a few weeks) prior to the experimental manipulation. In conclusion, MS manipulation could enhance the strong belief factor, analytical reasoning and death anxiety, especially with poor adherence participants.

Chapter 7. General Discussion

7.1 Introduction

This chapter sets out the contributions of the present thesis to knowledge in the field. As such, it critically examines the findings of the studies on MES. Many strongly held beliefs are resistant to counterargument, which means that many of the beliefs we consider to be pathological (i.e., delusions) may be at least partially explicable in terms of the processes that facilitate strong beliefs in general.

7.2 Summary of the Key Results of Each Study

Table 7.1 summarises the data samples employed in this thesis. In the first paper, our confirmatory factor analyses concerning the three studies showed that paranoia and conspiracist thinking were better explained as two correlated factors rather than as a single factor model. These two distinct yet correlated factors were also both correlated with a number of psychological constructs, for example, the two factors of the external locus of control (chance and powerful others). Loneliness was also correlated with both paranoia and conspiracist thinking, although the effect was greater in relation to paranoia. Paranoia was highly associated with high negative self-esteem and low positive self-esteem, whereas conspiracy theory beliefs were associated with positive self-esteem and narcissism.

Table 7.1

All the data collected in this thesis, Sample , the sample size, and the chapters used it.

Data collected	Sample	Sample size	Data used in
First survey	Online survey, sample from University of Liverpool, University of Oxford, and Ulster University.	496	Chapter 3: first study.
Second survey	Representative of the UK population sample by Qualtrics.	1508	Chapter 3: second study. Chapter 5: first study.
Third survey	Online survey by Qualtrics, sample from twitter.	488	Chapter 4: first study.
Fourth survey	Replication of the UK population sample. Online survey by Qualtrics.	638	Chapter 3: third study. Chapter 4: second study. Chapter 5: second study.
Fifth survey	Online experiment by Qualtrics.	245	Chapter 6.

These results are consistent with those of prior studies (Imhoff & Lamberty, 2018; Kaney & Bentall, 1989; Kay & Eibach, 2013; Kay et al., 2008; Tiernan et al., 2014; van Prooijen & Acker, 2015). However, in the present study, insecure attachment (anxious attachment) and avoidant attachment were both found to be highly associated with paranoia when compared with conspiracist thinking. The final psychological construct we studied was analytical reasoning, and we found poor analytical reasoning to be associated with only conspiracist thinking.

In the second paper, we sought to fill a gap in the literature concerning religious beliefs by developing a scale that could measure monotheism and atheism as two distinct factors. The confirmatory factor analyses showed that monotheism and atheism were better explained as two separate dimensions than as one dimension. The second paper also investigated the association of both death anxiety and analytical reasoning with the two belief systems. It found that death anxiety was associated with religious beliefs but not with atheist beliefs, while analytical reasoning was negatively associated with religious beliefs but had no association with atheist beliefs.

In the third paper, with regard to the first study, we attempted to confirm the presence of a common strong belief element in all nine different kinds of beliefs, namely paranoia, conspiracy theories, religiosity, social liberalism, personal liberalism, conservatism, and belief in witchcraft, superstition and precognition. The study compared the separate correlated factors with a bifactor model that included a common underlying factor to explain the covariation between the belief systems. The utilised method involved comparing model fit indices, for example, the non-significant chi-square, comparative fit index, the Tucker Lewis index of best fit and the Bayesian information criterion. Using the thresholds for these indices, beliefs that were not related to a general tendency toward strong beliefs were eliminated. Bifactor-specific statistics concerning the reliability, hierarchical and relative omega values were also used to interrogate the bifactor models. Moreover, multivariate and bivariate regression models were employed to study the effects of age, gender, analytical reasoning and death anxiety on the general and specific factors used in the bifactor model.

The first study found preliminary evidence regarding the hypothesised general belief factor S. Nonetheless, the threshold for strong beliefs entailing adequate fit indices for the model was only arrived at after excluding political beliefs. The model also showed low-reliability levels for beliefs related to the supernatural. The inferred latent factor we termed 'S' contributed considerably to paranoia, conspiracy and religious beliefs, and it made equivocal contributions to supernatural beliefs. Aside from these findings, the study also noted a strong relation between death anxiety and paranoia in the multivariate model in which the other beliefs were included.

The second study involved the development of a confirmatory factor model with which the previously identified strong beliefs could be confirmed. It focused on seven different kinds of beliefs (paranoia, conspiracy theories, religiosity, atheism, constructive

patriotism, nationalism, witchcraft, superstition and precognition), which were each loaded on separate uncorrelated factors within the bifactor model. Essentially, all the beliefs with belief scales that were low or negative in the bifactor model that showed no strong relation to the general tendency toward strong belief were eliminated. The eliminated beliefs had been hypothesised to be beliefs related to atheism and patriotism.

The method of analysing the associations of S with specific factors (age, gender, analytical thinking and death anxiety) applied in the first study was also used in the second study. The second study, therefore, replicated the first, albeit with improved measures that were sufficient to confirm its findings. The general finding of the second study was that the hypotheses were supported by the excellent overall fit of the final bifactor model. Death anxiety and analytical reasoning were found to be stronger predictors of S than any of the other beliefs, as was the case in the first study. However, in the second study, the supernatural belief dimensions were found to exhibit low levels of S reliability when assessed using the same measures as used in the first study.

The fourth paper detailed an online experimental study conducted to determine whether MS enhances the mechanisms behind the strong belief latent factor S identified in the earlier bifactor analyses. Independent-samples T-tests were used to compare the mean scores of the PANAS, Death Anxiety Inventory and Strong Beliefs Scale between the experimental groups – one of which had been induced to think about non-mortality threatening aversive experiences and one that had not – in order to assess the impact of death anxiety. A two-way ANOVA of the groups was also conducted to identify the level of adherence and non-adherence to the study protocol.

The study found that the MS group reported higher negative affect when compared with the control group, which is in stark contrast to other studies that found non-significant

effects on both positive and negative affect scales (Tremayne & Curtis, 2007; Trémolière et al., 2013). The analytical reasoning results were consistent with those of some prior studies that found thoughts of death to be associated with poor analytical reasoning in the MS group (Trémolière et al., 2013). The overall findings supported the hypothesis that thoughts of death affect the mechanisms linked to strong beliefs. Post hoc, we wondered whether these findings could have been compromised by the non-compliance with the experimental protocols on the part of some of the study's participants. We found that the level of non-compliance was greater in the MS condition and, surprisingly, that the effects on the outcome variables were the greatest in the non-compliant participants. One plausible explanation for this is that non-compliance reflected a peculiar sensitivity to mortality issues, meaning that, paradoxically, these participants showed a strong MS effect simply as a consequence of being asked to perform the intervention task. This would imply that death anxiety was causal in terms of the observed effects. However, although the intervention brought about an increase in death anxiety and a decrease in analytical reasoning, as the measures were administered after the assessment of S, this represents an interesting area of future research.

7.3 Contributions and Limitations

The present study contributes to the explication of MES due to its many strengths. To begin with, it drew data from a large representative sample of the UK population, and it also tested a wide range of beliefs. Another major strength is the fact that the replication studies detailed in the first three papers confirmed the initial findings, thereby boosting their credibility.

However, although the bifactor analysis results were acceptable with regard to the general dimension, some of the specific dimensions yielded questionable replicability and reliability data. For example, the general dimensions accounted for 95% and 97% of the

reliable variances in studies one and two, respectively, although little reliable variance was observed in some of the specific belief factors when this general dimension was eliminated. In study one, for example, witchcraft and superstition both had variances of 17% and precognition of 31%, while in study two, witchcraft had a variance of 30%, superstition of 21% and precognition of only 8%. These low variances suggest that very little reliable variance can be explained by factors specific to the beliefs in question. The fact that the bifactor model was only adequate after excluding political beliefs in the first study, as well as after excluding patriotism and atheism in the second study, suggests that a general dimension reflecting a propensity to hold strong beliefs cannot account for all belief systems. Although we predicted these findings with regard to atheism and patriotism, we did not preregister these predictions, which represents a weakness of the study. Overall, the findings point to the need to develop a strong theoretical statement regarding which beliefs are affected by S prior to proceeding to further any preregistered replications.

A second limitation of the research concerns the fact that the different studies used common datasets. This meant that, for example, we did not consider death anxiety in the structural equation models comparing paranoia and conspiracy theories simply because, at the time that the work was performed, we had not developed the theoretical formulation of S that informed our bifactor analyses. Some findings did not replicate across the studies, possibly due to the different analytic models involved. Most conspicuously, in the structural equation models comparing paranoia to conspiracy theories, deficient analytical reasoning appeared to make very little contribution to paranoia, while in the bifactor studies, we seemed to find a strong relationship between both conspiracy theories and S, which was in turn associated with poor analytical reasoning. The implication of this is that impaired

analytical reasoning does have a strong influence on paranoia, albeit via the strong belief common factor S.

7.4 MES and Delusions

A final limitation of the present study is the fact that it did not include clinical samples. This could be considered a major oversight given that the whole project was inspired by the thought that there may be common factors involved in delusional beliefs and MES such as religious and political beliefs, as postulated by Bentall (2018). The original intention was to conduct parallel studies with samples of patients with psychosis, although this was ultimately not possible due to the time and resources required to undertake the studies reported in this thesis. As the similarity hypothesis implies, would deluded patients show high levels of death anxiety and impaired analytical reasoning and, further, would they show a greater propensity to strongly hold non-delusional beliefs? A few studies have reported high death anxiety among psychiatric patients in general (Pollak, 1980; Templer et al., 1971), while others have reported poor analytical reasoning among patients with psychosis (Freeman et al., 2014; Puveendrakumaran et al., 2020), although to the best of our knowledge no studies have examined, for example, the propensity for strong political and religious beliefs among psychotic samples. This appears to be a fruitful avenue of future research.

The idea that common factors play a role in delusional and non-delusional beliefs does not preclude the possibility that there are also specific factors that play a role in delusional beliefs. It would be useful, therefore, if future studies conducted comparisons between deluded patients and people with strong political and religious ideologies, for example, using the phenomenological approaches briefly mentioned in Chapter 1. In his account of the MES construct, Bentall (2018) concluded that the unique feature of delusions is the fact that they

are not shared with other people. Thus, to understand what makes delusions different, it may be necessary to focus on both the social-cognitive processes and environmental factors (e.g. social isolation) that affect belief transmission and proliferation within different populations. Interestingly, a recent epidemiological study found social isolation to be very strongly associated with paranoid beliefs (Butter et al., 2017).

The present findings may have clinical implications, although this issue needs to be explored in future clinical studies. For example, little or no attention has been paid to the question of whether addressing death anxiety might prove useful in psychotic patients. In fact, perhaps because death anxiety is to some extent a universal human condition (Becker, 1974), the psychological research on how to address it remains sparce and, to some extent, centred on philosophical insights rather than psychological theory (Yalom, 2008). One approach that may be more easily implemented involves enhancing analytical reasoning (Cullen et al., 2018; Ku & Ho, 2010; Lambe et al., 2016).

7.5 Final Comments

The four studies described in this thesis explored the concept of MES and yielded insights into the common factors that may underlie strongly held beliefs as well as certain factors that distinguish particular sets of beliefs. The findings provide initial and qualified support for the notion that there may be common processes underlying many tenaciously held belief systems. This work was largely exploratory and, although none of the included studies can be considered definitive, it sets the agenda for the future replication, expansion and refinement of the theory.

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Appendices

Table 3.S1

Additional measures included in the three surveys. Note that each survey was multipurpose, and so only a subset of measures was considered for the purposes of the present research.

Study 1:

Duke University Religion Index (DUREL; Koenig and Büssing, 2010) a five-item measure of religious involvement. The scale covers three major dimensions of religiosity: organizational religious activity (ORA) (e.g. “How often do you attend church or other religious meetings?”; non-organizational religious activity (NORA) (e.g. “How often do you spend time in private religious activities, such as prayer, meditation or studying religious texts?” and intrinsic (or subjective) religiosity (IR) (e.g. “In my life, I experience the presence of the Divine (i.e., God)”. Participants have to respond on 6-point scales for the activity measures (from “Never” to “More than once/week” for ORA and from “Rarely or never” to “More than once a day” for the NORA), and respond using 5-point scales (“Definitely not true” to “Definitely true of me”) for the intrinsic religiosity items.

Social and Political Attitudes Scale (Wilson and Patterson, 1968) is a 14 item scale compiled from previous scales. Participants are asked to what extent they favour each item (e.g. “The death Penalty”, “Spending money on the demand forces”, “Legalized abortion” and “Lower taxes to promote business”). And they have to respond on 5-point scales ranging from (“Strongly disagree with” to “Strongly agree with”).

Identity constructs was assessed by using three-items: "I identify with…."; "I feel a sense of belonging to…."; "I feel strong ties with…." The first and last were taken from Doosje et al.'s (1995); The third item, 'I feel a sense of belonging to' was added as the literature suggested that having strong ties or identifying with a group did not in fact mean that an individual felt they 'belonged' (Lee and Robbins, 1998).

Each item is rated along a 7-point scale ("Strongly disagree" to "Strongly agree") for eight different constructs: "my family"; "my friends in my home town"; "my university"; "my friends at university"; "people with the same religious beliefs as me"; "people I attend a place of worship with"; "people who share my political opinions"; "a political organization or party". The scale has previously been piloted in a study of social identity in Liverpool University students (in preparation for publication).

One-item self-esteem scale (Robins et al., 2001): "I have high self-esteem" rated on a 7-point scale ("Not very true of me" to "Very true of me").

The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS; Haver et al., 2015) In this 7-item short scale, participants will read statements about feelings and thoughts (e.g. "I've been feeling optimistic about the future"; "I've been feeling relaxed"; "I've been dealing with problems well"; and "I've been feeling close to other people". The SWEMWBS is scored on a 5-point scale, ranging from "none of the time" to "all of the time".

The Disgust Scale-Revised (DS-R; Haidt, McCauley and Rozin, 1994, modified by Olatunji et al., 2007). The DS-R consists of 25-items and covering 3 dimensions of disgust: core disgust (12 items), animal reminder disgust (8 items), and contamination-based disgust (5 items).

The DS-R items are divided into two parts, part 1 with items from 1 to 13 to answer with 2-point scale (True or False) (e.g. “I might be willing to try eating monkey meat, under some circumstances”, “Seeing a cockroach in someone else’s house doesn’t bother me”, “I would go out of my way to avoid walking through a graveyard”, and “I never let any part of my body touch the toilet seat in a public washroom”). Items in part 2 from 14 to 25 ask the participant’s opinion about different experiences (e.g. “if you see someone put ketchup on vanilla ice cream and eat it, “You are about to drink a glass of milk when you smell that it is spoiled” and “A friend offers you a piece of chocolate shaped like dog-doo”) and the answers are a 3-points scale (Not, Slightly and Very).

Study 2:

Centrality of Religiosity Scale (CRS; Huber and Huber, 2012) is a 15-item scale (e.g. “How often do you think about religious issues?”, “To what extent do you believe that God or something divine exists?” and “How often do you take part in religious services?”. Responses for 12 items are rated on 5-point scales (“Never” to “Very often”). While 3 items only are rated on 8-point scales (“Never” to “Several times a day”).

Social and Political Attitudes Scale (Wilson and Patterson, 1968) is a 14-item scale compiled from previous scales. Participants are asked to what extent they favour each item (e.g. “The death Penalty”, “Spending money on the demand forces”, “Legalized abortion” and “Lower taxes to promote business”). And they have to respond on 5-point scales ranging from (“Strongly disagree with” to “Strongly agree with”).

Revised Paranormal Belief Scale (Tobacyk, 2004) is a 26 item scale distributed on 7 different subscales (Traditional religious belief, Psi, Witchcraft, Superstition, Spiritualism, Extraordinary life forms and Precognition). In this study three subscales only were used. Witchcraft (4 items) (e.g. “Black magic really exists” and “There are actual cases of witchcraft”), Superstition (3 items) (e.g. “Black cats can bring bad luck” and “The number 13 is unlucky”) and Precognition (4 items) (e.g. “Astrology is a way to accurately predict the future” and “Some psychics can accurately predict the future”). Responses are rated on 7-point scales (“Strongly disagree” to “Strongly agree”).

The Death Anxiety Inventory (Tomás-Sábado, Gómez-Benito and Limonero, 2005) is a 17-item scale with four subscales (Externally Generated Death Anxiety, Death Acceptance, Death Finality and Thoughts About Death). Responses are rated on 5-point scales (“Totally disagree” to “Totally agree”).

Social Network Index (Cohen et al., 1997) is a 12-item scale that assesses participation in 12 types of social relationships. These include relationships with a spouse, parents, parents-in-law, children, other close family members, close neighbours, friends, workmates, schoolmates, fellow volunteers, members of groups without religious affiliation, and religious groups.

Epistemic Beliefs Inventory (Garrett and Weeks, 2017) is a 12-item scale divided into three subscales; Faith in Intuition for facts (e.g. “I trust my gut to tell me what's true and what's not”), Need for evidence (e.g. “A hunch needs to be confirmed with data”), and Truth is

political (e.g. “Facts are dictated by those in power”). Responses are rated on 5-point scale (1 = “Strongly disagree”, 5 = “Strongly Agree”).

Multi-group Ethnic Identity Measure (Phinney, 1992). A three-subscales (Ethnic group (e.g. “I am active in organizations or social groups that include mostly members of my own ethnic group.”), Religious group (e.g. “I have spent time trying to find out more about my religion, such as its history, traditions, and customs.”), and Nationality (e.g. “In order to learn more about my nationality, I have often talked to other people about my nationality.”) each subscale has 12 items. Responses are rated on 5-point scale (1 = “Strongly disagree”, 5 = “Strongly Agree”).

Dependence on Routines (Zmigrod, Rentfrow and Robbins, 2018). an 8-item scale measures participants’ dependence on routines in their daily lives (e.g. “I tend to change my plans last minute.”). Responses was measured with a 5-item Likert scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). Responses are rated on 5-point scale (1 = “Strongly disagree”, 5 = “Strongly Agree”).

The *Hopelessness Scale* (Fraser et al., 2014). A brief two-item scale (e.g. “The future seems to me to be hopeful and I believe that things are changing for the better.” And “I feel that it is possible to reach the goals I would like to strive for.) Responses are rated on 5-point scale (1 = “Strongly disagree”, 5 = “Strongly Agree”).

Facial trust detection test: based on the trustworthiness dataset (25 identities) from (Todorov et al., 2013 and Todorov & Oosterhof, 2011). The faces dataset obtained from the

databases of the Social Perception Lab's website (http://tlab.princeton.edu/databases/secretdatabaseportal/). The databases consist of identities manipulated on different traits (attractiveness, competence, dominance, extroversion, likeability, threat, and trustworthiness). We selected randomly using the website www.Random.org only 10 computer-generated male faces (5 trustworthy and 5 untrustworthy). For each face, participants will be simply asked to rate, "How much would you trust this person" on a 7-point Likert scale (1 = I would not trust this person at all", 7 = "I would trust this person completely."). A Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers et al., 2011).

General Trust Questionnaire (Yamagishi and Yamagishi, 1994). Is a 6-item scale (e.g. "Most people are basically honest." And "I am trustful."). Responses are rated on a 5-point scale (1 "Strongly disagree", 5 "Strongly agree").

Name Letter Effect (Nuttin, 1987). A measure for implicit self-esteem. Participants have to rate the attractiveness or likability of the alphabet letters. Each letter were presented in both capital and small case and the participant had to rate the likability to it on a 9-point scale (1 "I do not like it at all", 9 "I like it a lot")

The Big Five Personality Traits (Rammstedt and John, 2007). a 10-item scale measuring the Big Five personality traits Extraversion (e.g. "I see myself as someone who is reserved."), Agreeableness (e.g. "I see myself as someone who is generally trusting"), Conscientiousness (e.g. "I see myself as someone who tends to be lazy"), Emotional Stability (e,g, "I see myself as someone who is relaxed, handles stress well."), and Openness (e.g. "I see myself as

someone who has an active imagination"). Responses are rated on a 5-point scale (1 "Strongly disagree", 5 "Strongly agree").

Study 3:

British History Test. This scale was designed specifically for this survey and consists of 10 true or false questions about Great Britain's history.

Revised Paranormal Belief Scale (Tobacyk, 2004) is a 26-item scale distributed on 7 different subscales (Traditional religious belief, Psi, Witchcraft, Superstition, Spiritualism, Extraordinary life forms and Precognition). In this study three subscales only were used. Witchcraft (4 items) (e.g. "Black magic really exists" and "There are actual cases of witchcraft"), Superstition (3 items) (e.g. "Black cats can bring bad luck" and "The number 13 is unlucky") and Precognition (4 items) (e.g. "Astrology is a way to accurately predict the future" and "Some psychics can accurately predict the future"). Responses are rated on 7-point scales ("Strongly disagree" to "Strongly agree").

Monotheism and Atheism Beliefs Scale. An 18-item scale distributed on two subscales; 11-items of Monotheism (e.g. "God is aware of everything we do") and 7-items on Atheism (e.g. "Religious beliefs will ultimately be replaced by scientific theories") Responses were made on a 5-point scale: 1: strongly disagree; 2: disagree; 3: neither agree or disagree; 4: agree; 5: strongly agree.

Nationalism and Constructive Patriotism (Davidov, 2010). Constructive Patriotism was measured by three questions: ''How proud are you of Britain in the way democracy

works?''; ''How proud are you of Britain National Health Services?''; and ''How proud are you of Britain's fair and equal treatment of all groups in society?'' They were measured on a 4-point scale ranging from 1 (not proud at all) to 4 (very proud). Nationalism was measured by two statements: ''The world would be a better place if people from other countries were more like the British'' and ''Generally speaking, Britain is a better country than most other countries''. They were measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Santa Clara Strength of Religious Faith Questionnaire, Short-Form (RFQ3; Storch et al., 2004) is a 3-item scale (e.g. "My faith is extremely important to me"). Responses were measures on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Authoritarian Parenting Scale (Buri, 1991) We used the authoritarian subscale only in this study. 20-item about parent authority; 10-item for mother (e.g. "Whenever my mother told me to do something as I was growing up, she expected me to do it immediately without asking any questions") and 10-item for father (e.g. "As I was growing up my father let me know what behaviour he expected of me, and if I didn't meet those expectations, he punished me."). Responses were made on a 5-point scale: 1: strongly disagree; 2: disagree; 3: neither agree nor disagree; 4: agree; 5: strongly agree.

The Patient Health Questionnaire – Depression Module (PHQ-9; Kroenke, Spitzer, and Williams, 2001) a 9-item scale based on the 9 DSM-IV criteria (e.g. "Little interest or pleasure in doing things") and responses are ranging from "0" (not at all) to "3" (nearly every day).

Facial trust detection test: based on the trustworthiness dataset (25 identities) from (Todorov et al., 2013 and Todorov & Oosterhof, 2011). The faces dataset obtained from the databases of the Social Perception Lab's website (http://tlab.princeton.edu/databases/secretdatabaseportal/). The databases consist of identities manipulated on different traits (attractiveness, competence, dominance, extroversion, likeability, threat, and trustworthiness). We selected randomly using the website www.Random.org only 10 computer-generated male faces (5 trustworthy and 5 untrustworthy). For each face, participants will be simply asked to rate, "How much would you trust this person" on a 7-point Likert scale (1 = I would not trust this person at all", 7 = "I would trust this person completely.").

The Mortality Salience priming manipulation (MS; Rosenblatt et al., 1989) consists of two open-ended questions: "Please, briefly describe the emotions that the thought of your own death arouses in you" and "Jot down, as specifically as you can, what you think will happen to you as you physically die.". For the aversive control condition, the word death will be replaced in this survey with dental pain.

Strong Beliefs Questionnaire is a 12-item scale designed especially for this study. It was derived from the bifactor model in study 2. We chose the highest factor-loading items on the strong belief factor from the scales: PADS (e.g. "Some people want to hurt me deliberately.."), GCBS (e.g. "A small, secret group of people is responsible for making all major world decisions, such as going to war..") , Paranormal beliefs (e.g. "A horoscope can accurately tell person's future."), Religiosity (e.g. "God sometimes reveals his will directly to

human beings."), Responses are rated on 5-point scale, from ("strongly disagree" to "strongly agree").

Table 3.S2

Study 1 partial correlation coefficients between psychological predictor variables and paranoia and conspiracy mentality.

Predictor Variables		Paranoia		Conspiracy Mentality	
		r	Partial r	r	Partial r
Attachment	Model of Self	-.464***	-.455***	-.115*	.060
	Model of Others	-.188***	-.161**	-.110*	-.047
Self-schemas	Positive Self	-.293***	-.307***	-.017	.098*
	Negative Self	.391***	.413***	.012	-.147**
	Positive Others	-.206***	-.203***	-.045	.030
	Negative Others	.401***	.344***	.255***	.131**
Locus of control	Internality	-.120*	-.118*	-.028	.016
	Chance	.413**	.366***	.222***	.089
	Powerful Others	.342***	.288***	.223***	.117*
Loneliness		.518***	.508***	.131**	-.065

Note: * p < .05; ** p < .01; *** p < .001.

The partial correlations controlled for the other outcome variable (i.e. when paranoia is the predicted variable, conspiracy mentality is the control variable and vice-versa).

Table 3.S3

Study 2 partial correlation coefficients between psychological predictor variables and paranoia and conspiracy mentality.

Predictor Variables		Paranoia		Conspiracy Mentality	
		r	Partial r	r	Partial r
Attachment	Model of Self	-.434***	-.416***	-.148***	.053*
	Model of Others	-.164***	-.198***	.033	.118***
Self-esteem	Positive	-.242***	-.304***	.070**	.202***
	Negative	.729***	.682***	.356***	.058*
Locus of Control	Internality	-.028	-.065*	.070**	.091***
	Chance	.519***	.404***	.438***	.273***
	Powerful Others	.542***	.436***	.430***	.255***
Loneliness		.590***	.539***	.287***	.038
Cognitive Reflection Test	Number correct	-.095**	.008	-.233***	-.214***

Note: * p < .05; ** p < .01; *** p < .001.

The partial correlations controlled for the other outcome variable (i.e. when paranoia is the predicted variable, conspiracy mentality is the control variable and vice-versa).

Table 3.S4

Study 3 partial correlation coefficients between psychological predictor variables and paranoia and conspiracy mentality.

Predictor Variables		Paranoia		Conspiracy Mentality	
		r	Partial r	r	Partial r
Attachment	Avoidant Attachment	.039	.034	.020	.000
	Attachment Anxiety	.008	-.010	.033	.034
Self-esteem	Positive	-.059	-.096*	.048	.090*
	Negative	.468***	.322***	.430***	.255***
Locus of Control	Internality	.119**	.098*	.069	.011
	Chance	.413***	.243***	.450***	.307***
	Powerful Others	.432***	.264***	.455***	.306***
Narcissism		.195***	.053	.301***	.239***
Cognitive Reflection Test	Number correct	-.094*	.052	-.273***	-.263***

Note: * p < .05; ** p < .01; *** p < .001.

The partial correlations controlled for the other outcome variable (i.e. when paranoia is the predicted variable, conspiracy mentality is the control variable and vice-versa).

Supplementary Table 5.S1

Study 1: Bifactor model of standardised correlation with specific factor and general factor: nine factors (paranoia, conspiracy mentality, religiosity, 3 paranormal beliefs (witchcraft, superstition and precognition) and 3 social and political attitudes (social liberalism, personal liberalism and conservatism).

	Item	β (se)	*p*	General Factor	
				β (se)	*p*
Paranoia	1. My friends often tell me to relax and stop worrying about being deceived or harmed.	.545(.019)	< .001	.288(.025)	< .001
	2. Sometimes, when I am out in public, I feel that people might be talking about me.	.708(.015)	< .001	.303(.024)	< .001
	3. I'm often suspicious of other people's intentions towards me.	.800(.012)	< .001	.270(.025)	< .001
	4. People will almost certainly lie to me.	.704(.015)	< .001	.271(.025)	< .001
	5. I often worry about being criticized or rejected in social situations	.713(.014)	< .001	.294(.025)	< .001
	6. I believe that some people want to hurt me deliberately.	.717(.014)	< .001	.323(.024)	< .001
	7. You should only trust yourself.	.500(.021)	< .001	.208(.026)	< .001
	8. Sometimes I think there are hidden insults in things that people say or do.	.749(.013)	< .001	.312(.024)	< .001
Conspiracy mentality	1. The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret	.651(.016)	< .001	.300(.024)	< .001
	2. The power held by heads of state is second to that of small unknown groups who really control world politics	.662(.016)	< .001	.329(.024)	< .001
	3. Secret organizations communicate with extraterrestrials, but keep this fact from the public	.510(.018)	< .001	.508(.020)	< .001
	4. The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organization	.666(.015)	< .001	.436(.022)	< .001
	5. Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public	.626(.017)	< .001	.332(.024)	< .001
	6. The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement	.689(.015)	< .001	.358(.024)	< .001
	7. A small, secret group of people is responsible for making all major world decisions, such as going to war	.682(.015)	< .001	.412(.022)	< .001
	8. Evidence of alien contact is being concealed from the public	.491(.019)	< .001	.526(.020)	< .001
	9. Technology with mind-control capacities is used on people without their knowledge	.568(.017)	< .001	.487(.021)	< .001
	10. New and advanced technology which would harm current industry is being suppressed	.616(.017)	< .001	.358(.023)	< .001
	11. The government uses people as patsies to hide its involvement in criminal activity.	.723(.014)	< .001	.368(.023)	< .001
	12. Certain significant events have been the result of the activity of a small group who secretly manipulate world events.	.692(.015)	< .001	.439(.022)	< .001
	13. Some UFO sightings and rumors are planned or staged in order to distract the public from real alien contact.	.484(.019)	< .001	.528(.020)	< .001
	14. Experiments involving new drugs or technologies are routinely carried out on the public without their knowledge or consent.	.655(.016)	< .001	.384(.023)	< .001
	15. A lot of important information is deliberately concealed from the public out of self-interest.	.499(.020)	< .001	.216(.026)	< .001
Religiosity	2. To what extent do you believe that God or something divine exists?	.762(.014)	< .001	.403(.023)	< .001
	7. To what extent do you believe in an afterlife—e.g. immortality of the soul, resurrection of the dead or reincarnation?	.723(.014)	< .001	.457(.022)	< .001
	12. In your opinion, how probable is it that a higher power really exists?	.842(013)	< .001	.396(.023)	< .001

Paranormal beliefs	Witchcraft	1. Black magic really exists.	.476(.021)	.001	.634(.017)	< .001
		4. Witches do exist.	.536(.020)	< .001	.728(.014)	< .001
		7. Through the use of formulas and incantations, it is possible to cast spells on persons.	.514(.020)	< .001	.689(.015)	< .001
		10. There are actual cases of witchcraft.	-.242(.022)	< .001	.806(.011)	< .001
	Superstition	2. Black cats can bring bad luck.	.239(.179)	.180	.765(.013)	< .001
		5. If you break a mirror, you will have bad luck.	.829(.628)	.187	.760(.013)	< .001
		8. The number “13” is unlucky.	-.027(.028)	.336	.845(.009)	< .001
	Precognition	3. Astrology is a way to accurately predict the future.	.665(.020)	< .001	.590(.018)	< .001
		6. The horoscope accurately tells a person’s future.	.225(.020)	< .001	.769(.012)	< .001
		9. Some psychics can accurately predict the future.	.512(.019)	< .001	.713(.014)	< .001
		11. Some people have an unexplained ability to predict the future.	.468(.020)	< .001	.676(.015)	< .001
Social and Political Attitudes	Social liberalism	3. Multiculturalism.	.792(.016)	< .001	-.035(.027)	.194
		7. Higher benefits for the poor.	.448(.024)	< .001	-.083(.027)	.002
		8. Immigration.	.787(.016)	< .001	-.065(.027)	.015
		11. International government.	.524(.022)	< .001	-.138(.026)	< .001
		12. Rehabilitation for offenders.	.491(.023)	< .001	.028(.027)	.288
	Conservatism	1. The death penalty.	.487(.024)	< .001	-.173(.026)	< .001
		2. Spending money on the armed forces.	.654(.021)	< .001	-.055(.027)	.040
		4. Stiff jail terms for criminals.	.721(.020)	< .001	-.007(.027)	.797
		10. Lower taxes to promote business.	.342(.027)	< .001	-.143(.026)	< .001
		13. Traditional family values.	.638(.022)	< .001	-.040(.027)	.134
		14. Monogamy.	.354(.027)	< .001	.009(.027)	.730
	Personal liberalism	5. Voluntary euthanasia.	.587(.026)	< .001	-.053(.027)	.049
		6. Gay rights.	.573(.026)	< .001	-.033(.027)	.220
		9. Legalized abortion.	.767(.028)	< .001	.085(.027)	.001

Supplementary Table 5.S2

Study 1: Bifactor model of standardised correlation with specific factor and general factor: six factors (paranoia, conspiracy mentality, religiosity and 3 paranormal beliefs (witchcraft, superstition, and precognition)

		Item	β (se)	*p*	General Factor	
					β (se)	*p*
Paranoia		1. My friends often tell me to relax and stop worrying about being deceived or harmed.	.548(.019)	< .001	.282(.025)	< .001
		2. Sometimes, when I am out in public, I feel that people might be talking about me.	.710(.015)	< .001	.298(.025)	< .001
		3. I'm often suspicious of other people's intentions towards me.	.801(.012)	< .001	.266(.025)	< .001
		4. People will almost certainly lie to me.	.705(.015)	< .001	.267(.025)	< .001
		5. I often worry about being criticized or rejected in social situations	.715(.014)	< .001	.290(.025)	< .001
		6. I believe that some people want to hurt me deliberately.	.719(.014)	< .001	.317(.024)	< .001
		7. You should only trust yourself.	.502(.020)	< .001	.204(.026)	< .001
		8. Sometimes I think there are hidden insults in things that people say or do.	.751(.013)	< .001	.308(.024)	< .001
Conspiracy mentality		1. The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret	.652(.016)	< .001	.296(.025)	< .001
		2. The power held by heads of state is second to that of small unknown groups who really control world politics	.663(.016)	< .001	.326(.024)	< .001
		3. Secret organizations communicate with extraterrestrials, but keep this fact from the public	.515(.018)	< .001	.501(.020)	< .001
		4. The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organization	.669(.015)	< .001	.431(.022)	< .001
		5. Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public	.627(.016)	< .001	.330(.024)	< .001
		6. The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement	.691(.015)	< .001	.354(.024)	< .001
		7. A small, secret group of people is responsible for making all major world decisions, such as going to war	.684(.015)	< .001	.408(.023)	< .001
		8. Evidence of alien contact is being concealed from the public	.494(.019)	< .001	.523(.020)	< .001
		9. Technology with mind-control capacities is used on people without their knowledge	.571(.017)	< .001	.484(.021)	< .001
		10. New and advanced technology which would harm current industry is being suppressed	.616(.017)	< .001	.357(.024)	< .001
		11. The government uses people as patsies to hide its involvement in criminal activity.	.725(.014)	< .001	.364(.023)	< .001
		12. Certain significant events have been the result of the activity of a small group who secretly manipulate world events.	.694(.015)	< .001	.436(.022)	< .001
		13. Some UFO sightings and rumors are planned or staged in order to distract the public from real alien contact.	.488(.019)	< .001	.524(.020)	< .001
		14. Experiments involving new drugs or technologies are routinely carried out on the public without their knowledge or consent.	.657(.016)	< .001	.380(.023)	< .001
		15. A lot of important information is deliberately concealed from the public out of self-interest.	.497(.020)	< .001	.218(.026)	< .001
Religiosity		2. To what extent do you believe that God or something divine exists?	.760(.014)	< .001	.406(.023)	< .001
		7. To what extent do you believe in an afterlife—e.g. immortality of the soul, resurrection of the dead or reincarnation?	.721(.015)	< .001	.461(.021)	< .001
		12. In your opinion, how probable is it that a higher power really exists?	.840(.013)	< .001	.401(.023)	< .001
Paranormal beliefs	Witchcraft	1. Black magic really exists.	.484(.021)	< .001	.627(.017)	< .001
		4. Witches do exist.	.543(.020)	< .001	.723(.014)	< .001

		7. Through the use of formulas and incantations, it is possible to cast spells on persons.	.520(.020)	< .001	.685(.015)	< .001
		10. There are actual cases of witchcraft.	-.240(.021)	< .001	.812(.011)	< .001
	Superstition	2. Black cats can bring bad luck.	.245(.209)	.242	.761(.013)	< .001
		5. If you break a mirror, you will have bad luck.	.842(.730)	.249	.754(013)	< .001
		8. The number “13” is unlucky.	-.024(.028)	.402	.849(.009)	< .001
	Precognition	3. Astrology is a way to accurately predict the future.	.661(.020)	< .001	.594(.018)	< .001
		6. The horoscope accurately tells a person’s future.	.221(.020)	< .001	.769(.012)	< .001
		9. Some psychics can accurately predict the future.	.506(.019)	< .001	.718(.014)	< .001
		11. Some people have an unexplained ability to predict the future.	.463(.020)	< .001	.680(.015)	< .001

Supplementary Table 5.S3

Study 2: Bifactor model of standardised correlation with specific factor and general factor: nine factors (paranoia, conspiracy mentality, constructive patriotism, nationalism, religiosity, atheism, and 3 paranormal beliefs (witchcraft, superstition, and precognition)

	Item	β (se)	*p*	General Factor	
				β (se)	*p*
Paranoia	1. It is important to be on guard against being deceived or harmed.	.370(.038)	< .001	-.072(.041)	.079
	2. When I am out in public, people sometimes talk about me.	.478(.032)	< .001	.377(.035)	< .001
	3. Other people's intentions towards me are not always good.	.741(.022)	< .001	.174(.040)	< .001
	4. People will almost certainly lie to me.	.694(.024)	< .001	.267(.038)	< .001
	5. There is a risk that I will be criticised or rejected in social situations.	.740(.022)	< .001	.251(.038)	< .001
	6. Some people want to hurt me deliberately.	.649(.026)	< .001	.390(.035)	< .001
	7. You should only trust yourself.	.418(.035)	< .001	.292(.038)	< .001
	8. There are sometimes hidden insults in things that people say or do.	.680(.025)	< .001	.257(.038)	< .001
Conspiracy mentality	1. The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret	.681(.023)	< .001	.367(.036)	< .001
	2. The power held by heads of state is second to that of small unknown groups who really control world politics	.676(.023)	< .001	.431(.034)	< .001
	3. Secret organizations communicate with extraterrestrials, but keep this fact from the public	.441(.028)	< .001	.647(.025)	< .001
	4. The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organization	.581(.025)	< .001	.581(.028)	< .001
	5. Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public	.595(.026)	< .001	.482(.032)	< .001
	6. The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement	.612(.025)	< .001	.478(.032)	< .001
	7. A small, secret group of people is responsible for making all major world decisions, such as going to war	.627(.024)	< .001	.522(.030)	< .001
	8. Evidence of alien contact is being concealed from the public	.412(.027)	< .001	.676(.023)	< .001
	9. Technology with mind-control capacities is used on people without their knowledge	.510(.027)	< .001	.591(.027)	< .001
	10. New and advanced technology which would harm current industry is being suppressed	.539(.028)	< .001	.489(.032)	< .001
	11. The government uses people as patsies to hide its involvement in criminal activity.	.682(.023)	< .001	.490(.031)	< .001
	12. Certain significant events have been the result of the activity of a small group who secretly manipulate world events.	.634(.024)	< .001	.548(.029)	< .001
	13. Some UFO sightings and rumors are planned or staged in order to distract the public from real alien contact.	.455(.027)	< .001	.646(.025)	< .001
	14. Experiments involving new drugs or technologies are routinely carried out on the public without their knowledge or consent.	.605(.025)	< .001	.522(.030)	< .001
	15. A lot of important information is deliberately concealed from the public out of self-interest.	.521(.031)	< .001	.223(.039)	< .001
Constructive Patriotism	CP1: How proud are you of Britain in the way democracy works?	.437(.077)	< .001	-.051(.041)	.208
	CP2: How proud are you of Britain's National Health Services?	.254(.055)	< .001	.048(.041)	.240
	CP3: How proud are you of Britain's fair and equal treatment of all groups in society?''	.892(.143)	< .001	-.085(.040)	.035

Nationalism		N1: The world would be a better place if people from other countries were more like the British.	.896(.025)	< .001	.183(.040)	< .001
		N2: Generally speaking, Britain is a better country than most other countries.	.736(.038)	< .001	.109(.040)	.007
Religiosity		1. The soul is immortal.	.466(.029)	< .001	.491(.032)	< .001
		2. A higher power really exists.	.640(.023)	< .001	.522(.030)	< .001
		5. God has revealed his plan to us in holy books.	.652(.023)	< .001	.535(.030)	< .001
		6. We can communicate directly to God by praying.	.755(.020)	< .001	.480(.032)	< .001
		7. Sometimes it is possible for human beings to feel the presence of God.	.744(.020)	< .001	.439(.033)	< .001
		11. God or something divine sometimes interferes in the affairs of human beings.	.519(.027)	< .001	.503(.031)	< .001
		13. God sometimes reveals his will directly to human beings.	.693(.022)	< .001	.557(.029)	< .001
		14. There is an afterlife (immortality of the soul, resurrection of the dead or reincarnation).	.553(.026)	< .001	.523(.030)	< .001
		16. God is aware of everything we do.	.792(.019)	< .001	.493(.031)	< .001
		17. God hears the prayers of human beings.	.807(.019)	< .001	.491(.031)	< .001
		18. Our fate in the life hereafter is determined by our deeds on Earth.	.579(.025)	< .001	.555(.029)	< .001
Atheism		3. Religious beliefs will ultimately be replaced by scientific theories.	.590(.030)	< .001	.058(.041)	.155
		4. The idea of God is a delusion.	.781(.021)	< .001	-.101(.041)	.013
		8. Belief in gods has been the source of great misery to humankind.	.576(.031)	< .001	-.069(.041)	.089
		9. Moral judgement should be based on respect for humanity rather than religious doctrine.	.515(.033)	< .001	-.188(.040)	< .001
		10. There is nothing in the universe that cannot be explained by scientific laws.	.575(.030)	< .001	.003(.041)	.945
		12. Praying to God is a waste of time.	.775(.021)	< .001	-.120(.040)	.003
		15. It is wrong to indoctrinate children into a religion.	.630(.028)	< .001	-.121(.040)	.003
Paranormal beliefs	Witchcraft	1. Black magic really exists.	.428(.031)	< .001	.673(.023)	< .001
		4. Witches do exist.	.623(.031)	< .001	.576(.028)	< .001
		7. Through the use of formulas and incantations, it is possible to cast spells on persons.	.184(.027)	< .001	.832(.014)	< .001
		10. There are actual cases of witchcraft.	.586(.031)	< .001	.654(.025)	< .001
	Superstition	2. Black cats can bring bad luck.	.358(.035)	< .001	.734(.020)	< .001
		5. If you break a mirror, you will have bad luck.	.388(.033)	< .001	.813(.015)	< .001
		8. The number “13” is unlucky.	.418(.035)	< .001	.765(.018)	< .001
	Precognition	3. Astrology is a way to accurately predict the future.	-.035(.030)	.252	.852(.013)	< .001
		6. The horoscope accurately tells a person’s future.	-.078(.047)	.094	.872(.012)	< .001
		9. Some psychics can accurately predict the future.	.214(.088)	.015	.756(.020)	< .001
		11. Some people have an unexplained ability to predict the future.	.929(.409)	.023	.689(.024)	< .001

Supplementary Table 5.S4

Study 2: Bifactor model of standardised correlation with specific factor and general factor; seven factors (paranoia, conspiracy mentality, nationalism, religiosity, and 3 paranormal beliefs (witchcraft, superstition, and precognition)

	Item	β (se)	*p*	General Factor	
				β (se)	*p*
Paranoia	1. It is important to be on guard against being deceived or harmed.	.368(.038)	< .001	-.067(.041)	.098
	2. When I am out in public, people sometimes talk about me.	.479(.032)	< .001	.375(.035)	< .001
	3. Other people's intentions towards me are not always good.	.741(.022)	< .001	.174(.040)	< .001
	4. People will almost certainly lie to me.	.659(.024)	< .001	.266(.038)	< .001
	5. There is a risk that I will be criticised or rejected in social situations.	.740(.022)	< .001	.250(.038)	< .001
	6. Some people want to hurt me deliberately.	.650(.026)	< .001	.388(.035)	< .001
	7. You should only trust yourself.	.418(.035)	< .001	.291(.038)	< .001
	8. There are sometimes hidden insults in things that people say or do.	.680(.025)	< .001	.259(.038)	< .001
Conspiracy mentality	1. The government is involved in the murder of innocent citizens and/or well-known public figures, and keeps this a secret	.680(.023)	< .001	.368(.036)	< .001
	2. The power held by heads of state is second to that of small unknown groups who really control world politics	.675(.023)	< .001	.432(.034)	< .001
	3. Secret organizations communicate with extraterrestrials, but keep this fact from the public	.442(.028)	< .001	.645(.025)	< .001
	4. The spread of certain viruses and/or diseases is the result of the deliberate, concealed efforts of some organization	.581(.025)	< .001	.581(.028)	< .001
	5. Groups of scientists manipulate, fabricate, or suppress evidence in order to deceive the public	.593(.026)	< .001	.484(.032)	< .001
	6. The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement	.612(.025)	< .001	.479(.032)	< .001
	7. A small, secret group of people is responsible for making all major world decisions, such as going to war	.628(.024)	< .001	.522(.030)	< .001
	8. Evidence of alien contact is being concealed from the public	.412(.027)	< .001	.676(.023)	< .001
	9. Technology with mind-control capacities is used on people without their knowledge	.511(.027)	< .001	.589(.027)	< .001
	10. New and advanced technology which would harm current industry is being suppressed	.537(.028)	< .001	.490(.031)	< .001
	11. The government uses people as patsies to hide its involvement in criminal activity.	.681(.023)	< .001	.491(.031)	< .001
	12. Certain significant events have been the result of the activity of a small group who secretly manipulate world events.	.634(.024)	< .001	.548(.029)	< .001
	13. Some UFO sightings and rumors are planned or staged in order to distract the public from real alien contact.	.456(.027)	< .001	.645(.025)	< .001
	14. Experiments involving new drugs or technologies are routinely carried out on the public without their knowledge or consent.	.605(.025)	< .001	.522(.030)	< .001
	15. A lot of important information is deliberately concealed from the public out of self-interest.	.517(.031)	< .001	.228(.039)	< .001
Nationalism	N1: The world would be a better place if people from other countries were more like the British.	.896(.025)	< .001	.183(.040)	< .001
	N2: Generally speaking, Britain is a better country than most other countries.	.736(.038)	< .001	.109(.040)	.007
Religiosity	1. The soul is immortal.	.467(.029)	< .001	.492(.032)	< .001
	2. A higher power really exists.	.642(.023)	< .001	.519(.030)	< .001

		5. God has revealed his plan to us in holy books.	.656(.023)	< .001	.530(.030)	< .001
		6. We can communicate directly to God by praying.	.758(.020)	< .001	.475(.032)	< .001
		7. Sometimes it is possible for human beings to feel the presence of God.	.745(.020)	< .001	.437(.033)	< .001
		11. God or something divine sometimes interferes in the affairs of human beings.	.521(.027)	< .001	.501(.031)	< .001
		13. God sometimes reveals his will directly to human beings.	.695(.021)	< .001	.553(.029)	< .001
		14. There is an afterlife (immortality of the soul, resurrection of the dead or reincarnation).	.553(.026)	< .001	.523(.030)	< .001
		16. God is aware of everything we do.	.795(.019)	< .001	.488(.031)	< .001
		17. God hears the prayers of human beings.	.810(.019)	< .001	.487(.031)	< .001
		18. Our fate in the life hereafter is determined by our deeds on Earth.	.581(.025)	< .001	.553(.029)	< .001
Paranormal beliefs	Witchcraft	1. Black magic really exists.	.424(.031)	< .001	.675(.023)	< .001
		4. Witches do exist.	.620(.032)	< .001	.580(.028)	< .001
		7. Through the use of formulas and incantations, it is possible to cast spells on persons.	.180(.027)	< .001	.833(.014)	< .001
		10. There are actual cases of witchcraft.	.581(.031)	< .001	.658(.024)	< .001
	Superstition	2. Black cats can bring bad luck.	.364(.035)	< .001	.731(.020)	< .001
		5. If you break a mirror, you will have bad luck.	.391(.033)	< .001	.812(.015)	< .001
		8. The number “13” is unlucky.	.420(.035)	< .001	.764(.018)	< .001
	Precognition	3. Astrology is a way to accurately predict the future.	-.047(.033)	.152	.851(.013)	< .001
		6. The horoscope accurately tells a person’s future.	-.095(.044)	.031	.872(.011)	< .001
		9. Some psychics can accurately predict the future.	.231(.068)	.001	.761(.020)	< .001
		11. Some people have an unexplained ability to predict the future.	.824(.266)	.002	.696(.024)	< .001

Table 6.S1

The Growing Stone delay task:

Opinion Questionnaire 1: Literature

Please read the following short passage from a novel and answer the questions below it.

The automobile swung clumsily around the curve in the red sandstone trail, now a mass of mud. The headlights suddenly picked out in the night—first on one side of the road, then on the other—two wooden huts with sheet metal roofs. On the right near the second one, a tower of course beams could be made out in the light fog. From the top of the tower a metal cable, invisible at its starting-point, shone as it sloped down into the light from the car before disappearing behind the embankment that blocked the road. The car slowed down and stopped a few yards from the huts.

The man who emerged from the seat to the right of the driver labored to extricate himself from the car. As he stood up, his huge, broad frame lurched a little. In the shadow beside the car, solidly planted on the ground and weighed down by fatigue, he seemed to be listening to the idling motor. Then he walked in the direction of the embankment and entered the cone of light from the headlights. He stopped at the top of the slope, his broad back outlined against the darkness. After a moment he turned around. In the light from the dashboard he could see the chauffeur's black face, smiling. The man signaled and the chauffeur turned of the motor. At once a vast cool silence fell over the trail and the forest. Then the sound of the water could be heard.

The man looked at the river below him, visible soley as a broad dark motion flecked with occasional shimmers. A denser motionless darkness, far beyond, must be the other bank. By looking fixedly, however, one could see on that still bank a yellowish light like an oil

lamp in the distance. The big man turned back toward the car and nodded. The chauffeur switched off the lights, turned them on again, then blinked them regularly. On the embankment the man appeared and disappeared, taller and more massive each time he came back to life. Suddenly, on the other bank of the river, a lantern held up by an invisible arm back and forth several times. At a final signal from the lookout, the man disappeared into the night. With the lights out, the river was shining intermittently. On each side of the road, the dark masses of forest foliage stood out against the sky and seemed very near. The fine rain that had soaked the trail an hour earlier was still hovering in the warm air, intensifying the silence and immobility of this broad clearing in the virgin forest. In the black sky misty stars flickered.

How do you feel about the overall descriptive qualities of the story?

1 2 3 4 5 6 7 8 9

not at all descriptive somewhat descriptive very descriptive

Do you think the author of this story is male or female?

_____ male _____ female